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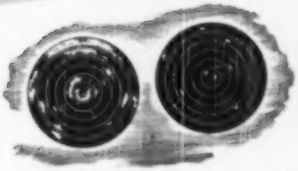
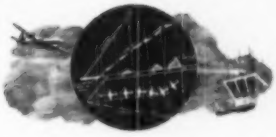


MTI Gilfillan's Moving Target Indicator eliminates "ground clutter." Tracking and identifying aircraft no longer requires the tedious concentration of a special radar operator. Exact bearing and range of aircraft are now seen instantly by all control tower personnel. Only Gilfillan has produced a reliable, drift-free, range-selectable MTI.

HIGH-POWERED SEARCH New Gilfillan GCA extends search coverage to 10,000 feet altitude over a 30-mile radius. Early GCA was limited to solid surveillance 18 miles out and 4,000 feet up. This seven-fold increase of original GCA coverage is a Gilfillan "bonus," vital to air traffic control.



AZEL SCOPE Gilfillan's three-dimensional Azel Scope changed GCA from a five-man to a simplified one-man operation. Now the exact position of approaching aircraft is seen clearly and accurately in three dimensions—altitude, azimuth and range. The Azel Scope is an exclusive Gilfillan feature.

TOWER CONSOLE Gilfillan's desk-size, one-man GCA console is in startling contrast to the 22-ton, five-man wartime trailer. By remoting the radar data to the control tower, air traffic personnel now have accurate plane position information instantly available. Consolidation of all GCA features into a compact console is an exclusive Gilfillan improvement.

WORLD-WIDE SERVICE Eighty Gilfillan factory-trained experts supervise GCA operation and maintenance throughout the world. Gilfillan GCA schools also train personnel of the CAA, the USAF, and the RCAF. Supervising all phases of GCA at airports the world over is an exclusive Gilfillan service.

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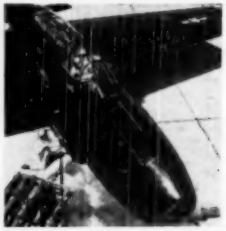

THE COVER: Northrop Scorpion (XF-89) is new 600-m.p.h.-plus all-weather fighter.

EDITORIAL

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FLYING

FEBRUARY • 1950

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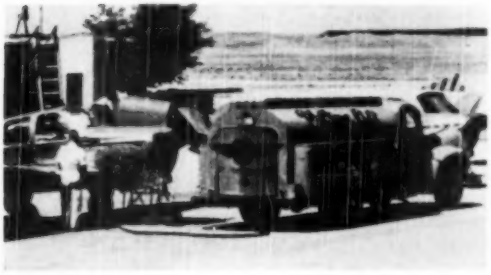
Carco Air Service probably carries more "brains per mile" than any other airline . . . and uses Phillips *66* Aviation Gasoline exclusively.

Clark M. Carr, owner and manager of Carco Air Service, has had a colorful 22-year career . . . barn-storming, making aerial surveys, selling and servicing aircraft in South America, and serving as captain in the Army Air Corps!



This unique "airlift" began operations in 1947 as an "on-call" charter service for the Atomic Energy Commission. It now carries an average of 1,000 passengers, plus 3,000 pounds of United States mail per month.

TOP ATOMIC SCIENTISTS are flown in and out of Los Alamos via the Carco "airlift." This miniature airline operates light, single-engine Beechcraft Bonanzas (carrying a maximum of 3 passengers per plane) over the mountains to Albuquerque. Rigid inspections, strict maintenance standards, and high-quality Phillips *66* Aviation Gasoline help Carco complete 97 per cent of their scheduled 6 round trips a day.

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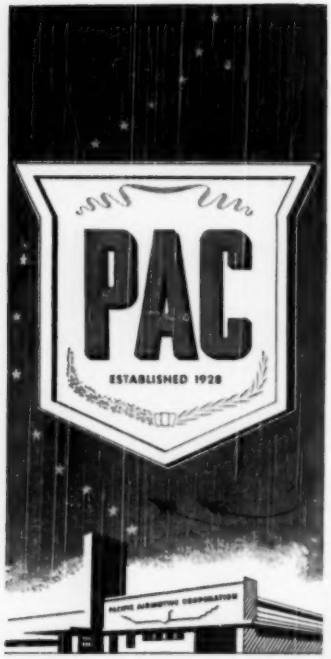

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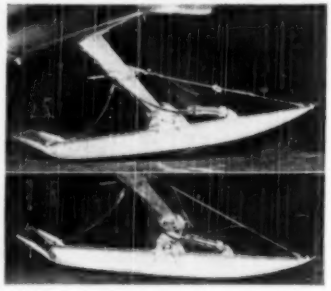
NOTES ON CIVIL FLYING

. . . **A transcontinental rocket liner** capable of crossing the United States in less than an hour is within the grasp of present day technology, according to Dr. Hsue-Shen Tsien, Caltech. The American Rocket Society has revealed a new promising oxidizer for rocket fuel—nitrogen tetroxide. It has high energy, is stable, has high density and is not very susceptible to decomposition.

. . . **1950 Cessna** 140's and 170's will have a new and more efficient cowl, easy access through addition of a convenient lift strap and new rubber shock mounted engine suspension.

. . . **Federal Aircraft Works,** Minneapolis, has developed a new combination wheel-ski which permits light planes to land and take-off on either bare runways or deep snow. They are available



with hydraulic or electrical actuation to raise or lower the ski position, or without actuation in a fixed position on the gear approximately one inch above the rolling radius of the tire. They can be adjusted manually, or tires can be removed altogether (see "I Land Anywhere," page 26).

. . . **The 1950 Aeronca Champion** will have a complete 12-volt electrical system including starter, generator, battery and necessary wiring for instrument, navigation and landing lights. The new Champion will have complete soundproofing, full-width rear seat, improved cowling hinge, No-Bounce gear, leading edge landing light, navigation lights, stainless steel mufflers and high output cabin heater.

. . . **A new non-crazing plastic** for aircraft windows and windshields has been developed by Sierra Products Company, and distributed by The Moulton Company, Burbank, Calif.

. . . **Private and non-scheduled** aircraft in continental U. S. flew approximately 15,130,000 hours in 1948—a decline of seven per cent from 1947, according to CAA. Of the hours flown, 57 per cent were for instructional purposes, 17 per cent for personal usage, 17 per cent for business flying, four per cent for transportation for hire, four per cent for other revenue-producing activities, and one per cent were not classified.

. . . **European Notes.** The French have completed advanced design work on the S.N.C.A.S.—O SO 5100 four-jet airliner. . . . First post-war Norwegian airplane is the Honningstad Type 5-A Finnmark. It is a 10-12 passenger (plus two crewmen) amphibian and looks like an enlarged gull-wing version of the Grumman Goose. Top speed is 190 m.p.h. . . . If U. S. airlines are not permitted to buy foreign-built craft, there is a possibility that the DeHavilland Comet might be built in the U. S.

. . . **Ryan** will bring out a new 260-h.p. Lycoming-powered "Super" Navion. It cruises at 170 m.p.h., climbs 1,250 f.p.m. with full load. Externally it is similar to the 205-h.p. De Luxe Navion, but has a three-inch longer nose, slightly different cowling lines, and larger propeller. Take-off distance is only 400 feet and it requires only 770 feet to clear a 50-foot obstacle from a standing start. Price is under $14,000 fully equipped.

. . . **Prospective aerial star route** bidders can obtain detailed information by writing Robert S. Burgess, Deputy Assistant Postmaster General, Post Office Department, Washington 25, D. C. He can provide information on how to bid for contracts authorized under the new air star mail routes.

. . . **New problems** of stratosphere operation have been posed with the discovery by University of Chicago meteorologists of a belt of air in the stratosphere with a 100-per cent water vapor saturation (see "Aviation's New Frontier," page 18).

. . . **NAA has adopted** new air racing rules, which include discontinuing NAA sanction for multiple lap, closed circuit jet aircraft racing. Minimum altitude for high speed, multiple lap closed circuit speed racers is increased from 200 feet to 500 feet, and maximum altitude from 500 feet to 1,000 feet.

. . . **First production** SAAB Scandia airliner has been successfully test flown in Sweden.

. . . **Aeronca** Aircraft Corporation has completed details of a refinancing plan which includes an RFC loan for $200,000 matching loan from Middleton citizens, and a $400,000 stock issue. Aeronca had unfilled orders on hand as of October 31 totalling $1,300,000.

Northrop student engineers designed and built these pulse-jet engines as a typical practical project assigned as part of the Institute's up-to-the-minute instruction in principles and operation of latest types of aircraft power plants.

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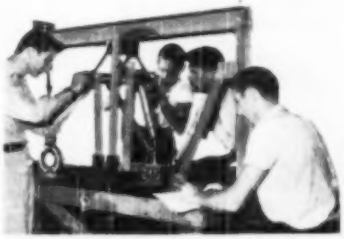

Experience duplicating every-day engineering duties in aircraft plants is an important advantage of NAI training. These students are testing a nose wheel installation for braking effects, in the Institute "test lab."

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MILITARY NEWS

. . . **Three Essex-class carriers** are being converted by the Navy for the handling of jet bombardment aircraft. Two additional Essex-type carriers will be converted at a later date. Modifications, which will enable operation of planes weighing as much as 26 tons, should take about two years.

. . . **British air reserves** (the Royal Auxiliary Air Force squadrons) have a strength of 5,350, with plans to increase personnel to 11,500. Thirty-five per cent of the squadrons now have jet fighters.

. . . **Primary flight** training for Air Force cadets would be given by private contractors, as during the war years, under a plan now being considered.

. . . **One fourth** of the 1950 Annapolis graduating class will be permitted to request transfer to the Air Force. West Point allots about 40 per cent of its annual graduates to the Air Force, which does not have an academy.

. . . **The Navy** has announced that its plane strength is being reduced approximately 20 per cent.

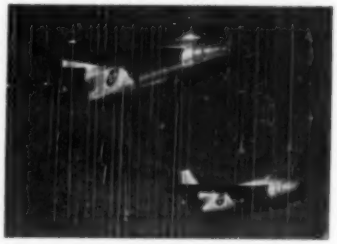
. . . **Two new Navy** jets should make their first flights in 1950: the single-engined Grumman F10F and the twin-engined Douglas F4D.

. . . **Northrop X-4** (with an approximate 24-foot wingspan) has been unofficially named the Bantam. It is being used for sub-sonic research on control of sweptwing types.

. . . **Navy** has ordered a total of 55 AJ-1 three-engined attack planes. Powerplants are two Pratt & Whitney R-2800 engines and an Allison J-33 turbojet.

. . . **Prone pilot's** cockpit will be tested by USAF in a Lockheed Shooting Star. The jet will have a special Plexiglas nose for pilot vision.

. . . **Swedish 650-m.p.h.** jet fighter, the Saab-29, will be produced in quantity for Swedish Air Force. It is a pressurized single-seat, single-jet interceptor



fighter with a bulky fuselage and swept-back wings. DeHavilland Ghost jet engines produce 5,000 pounds static thrust.

. . . **"Guestimating"** the speed of the three-jet Martin XB-51 bomber, Stanley H. Evans writes in the British aviation journal, Flight: ". . . if we assume that the total net propulsive thrust at top speed is of the order of 16,000 pounds, gross weight 80,000 pounds, wing area 600 square feet on a span of 55 feet, and total wetted surface area 4,000 square feet (giving a parasite drag coefficient of 0.023), our final pass turns up a maximum sea-level speed of 654 m.p.h. Since, however, this also produces a Mach Number of 0.86 and neglects any compressibility drag rise (an optimistic assumption, no doubt), we will settle for a top speed of around 630 m.p.h. (plus or minus 10 m.p.h.)!"

Sikorsky H-19, 12-place Air Force helicopter, cruises at 85 m.p.h., has a combat range of 280 miles. A commercial version of the all-metal 'copter will be marketed by Sikorsky.

PLANE FAX

Quick picture of

PALO ALTO AIRPORT Calif.

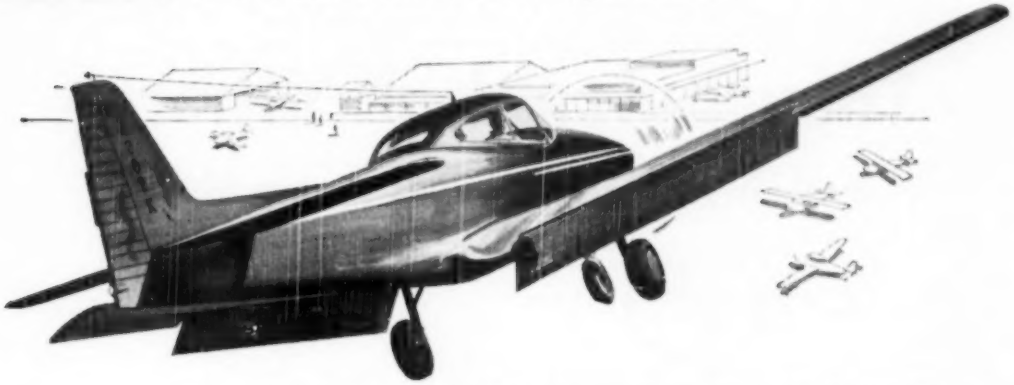
One of U.S.'s oldest private airports licensed by CAA to repair planes and engines • Air Search and Rescue • Headquarters, Palo Alto School of Aviation • Paved runways, lighted on request • Modern Standard Service equipment, trained attendants, Chevron gas, RPM oil and greases.

How airport owners help pilots keep costs down

Jack Nystrom, Superintendent of Maintenance of Palo Alto Airport, has started all planes at his field on RPM Aviation Oil "because it keeps engines running cleaner and freer, and cuts costs by reducing wear on vital parts. We use 'RPM' in our 16 Navions based at the field and in 115 additional Navions that fly into the field for service and repair work.

"One Continental E-185 was inspected after 1100 hours. The amount of engine wear was negligible, and the rings and valves were in excellent condition. The internal parts required only a washing off with a solvent.

"We feel that RPM Aviation Oil has done us a great service. And we will be only too glad to have you inspect any of our airplane engines when we tear them down so that you can see for yourselves what a really good oil can do."



Tips of the Month

"Let's get rid of 'pilot error'"

"These rules are fundamental—but easy to forget. They make flying safer—and more fun.

1. *Keep the plane clean—inside and out.*
2. *Watch the load factor—don't overload.*
3. *Follow the preventive maintenance schedule.*
4. *Don't hedge-hop. You may do it only once!"*

Jack Nystrom, Supt. of Maintenance, Palo Alto Airport

Pilots now request new Chevron 80/87 Gasoline—enjoy more power, smoother take-offs

"Everybody at the field has been asking for the new Chevron 80/87 Gasoline," writes Mr. Nystrom, "and we've had very good comments from all the pilots—many of whom had been using other brand fuels. We've found that it ends take-off knocking and pre-ignition, and gives us more power than the old 80 octane gasoline. It's a particularly good deal for the pilots who had been using 91/98 gasoline—because Chevron 80/87 costs less and saves them money."

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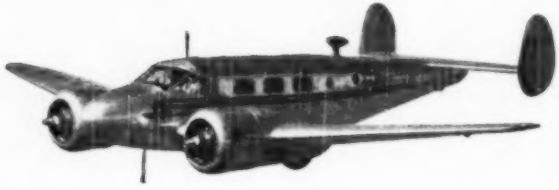
The Beechcraft Bonanza cruises at 170 mph, carries four people in its comfortable cabin. Range is 750 miles; top speed, 184 mph. It combines safety, ruggedness, comfort, economy, speed and performance — is equipped for day, night, and instrument flight.

Beechcraft 18

The twin-engine Beechcraft Executive Transport is relied upon all over the world for fast, dependable performance. This 200-mph plane carries 7 to 9 passengers in luxurious comfort — can be operated readily out of small fields.



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FLYING
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America's Jet Transport Dilemma

By WELLWOOD E. BEALL

Vice-President in Charge of Engineering and Sales,
Boeing Airplane Company.

NONE will deny that the era of the turbine-powered transport is now just around the corner. Just where this corner may be and how soon we in the United States will reach it is another matter.

Britain's construction of more than six different turbine-powered airliner prototypes leaves this country in the unenviable position of not only not having a single turbine-powered airliner flying but not even having one under construction.

Even with her accelerated development program, Britain does not plan to place any of these new and fast airplanes in service until 1951 or 1952. We believe this interval should give us the time necessary to build and fly a superior turbine-powered transport. Of necessity, such a project must get under way immediately if we are to compete effectively with foreign manufacturers.

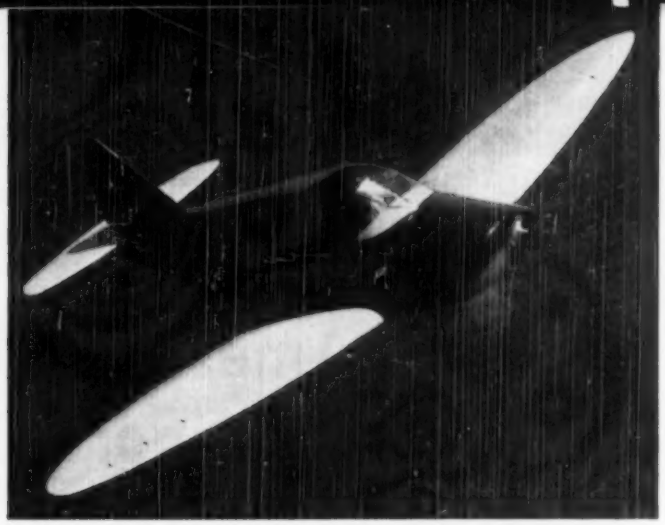
We now have on our drawing boards at Boeing a number of turbine-powered designs. Our experience with the 600-m.p.h. Boeing B-47 *(Stratojet)* leads us to believe we could have a jet transport prototype flying within 18 months of receiving a contract. After first flight it would take at the soonest another 18 months for testing and certification. On top of this, it would take another six months before the first jet would be flying in scheduled airline service if we started the construction of production quantities at the same time we started prototype construction. Still another six months or a year would be necessary to get any quantities delivered and in operation on the airlines. That is a total of four to five years.

The next transport airplane—the replacement for the present piston-engined short and medium range types—is destined to have a long and useful life. The practical jet will be an airplane which will push just as close as possible to the sonic zone without encountering sonic speed difficulties. Swept wings, clean design and more powerful jet engines will make possible an economical, efficient transport with cruising speeds above 500 m.p.h. and with operating costs even below those of current types over medium ranges.

To be more specific, we find that at a design range of approximately 1,000 miles, plus ATA reserves, the turbojet transport has a direct operating cost comparable to both turbine-propeller and reciprocating-engine planes. At design ranges of 3,000 miles or more, the economics of the jet suffers because of weight of the fuel load required.

On the other end of the ladder—very short range route segments—the jet suffers because of the high percentage of fuel required to climb to economical cruising altitude. Another penalty is imposed on the jet over short routes in that the jet plane still spends as much time on the ground as does the slower plane.

Our comparisons show that a turbo-jet operating at a design range of 1,000 miles offers greater profit and speed potential than either the turbo-prop or conventional airliner. This holds true even when the plane is operating with but a 50 per cent load factor. Thus, it seems, the medium-size, medium-range jet airliner appears (*Continued on page* 59)



Efficient Culver Cadet could have been a better airplane if minor changes had been allowed without complete new certification.

PART 03

THE RULES THAT

Shackle Plane Improvement

WHEN THE pre-war Culver *Cadet* was put on the market it developed an uncertain reputation because of one or two wing failures. Pilots put the plane into a dive—and lost a wing and their lives.

What was wrong?

The *Cadet's* wings met CAA specifications for strength. They passed all CAA tests. But the *Cadet* was an exceptionally clean airplane, and pilots weren't as used to flying clean planes then as now. More important, the Culver had an extremely sensitive elevator arrangement and very light stick forces. The result was that pilots found themselves building up too much speed and hauled back on the stick too sharply. The plane responded quickly—and the wing was gone.

Was this pilot error? Was the plane to blame? Or was the CAA wrong for certificating it?

It is this writer's conviction that the CAA was at fault and that, in fact, CAA certification rules are a millstone around the neck of private flying. With its rules, the CAA is ruining private flying when it is charged by law with promoting it.

Its blame is two-fold. First, CAA makes it too difficult and expensive to certificate new planes—especially unconventional aircraft. Second, CAA makes it too difficult and expensive to improve planes that have already been certificated.

In the case of the Cadet, the CAA was not at fault for certificating an airplane that failed under undue stress. The Culver had an ultimate load factor of over 7 G's—far more than normal requirements. And while a case could be made out that the CAA's requirement for small stick travel—a requirement that has since been rescinded—was the cause of the Culver's trouble, that is not the issue here. The main fault of the CAA was in supporting and operating an antiquated, costly and long-drawn out method of certification which effectively deterred Culver from making advisable changes.

Culver could have remedied the defect in its airplane by comparatively simple modifications. But that would have put the plane through a costly CAA stress analysis again. Culver couldn't do that without serious risk of going broke. All it could do was to advise pilots not to pull out too abruptly.

Thus the CAA regulations that were intended to save pilots' lives and to increase safety actually worked toward endangering lives and diminishing safety.

The Culver example is only one of scores of cases in which the CAA regulations have strangled progress. Planes that meet formal CAA specifications today could be markedly improved if the manufacturers could afford to get new type certificates for the changes that service has shown advisable.

Let's face it. The CAA has continually derided and condemned the personal aircraft industry for not providing new, radically different aircraft for the public. Yet the CAA type certificates are based upon engineering for-

mulae that help freeze present conventional airplane designs and penalize new and unorthodox designs.

John T. Griffith, president of the Massachusetts Aviation Trades Association, charged before the NATA annual meeting in November that "the CAA . . . was holding back at least one private effort to market a new agricultural airplane (the *Helioplane*)—not because they disapproved either the airplane or its proposed method of use, but merely because they haven't yet been able to set forth a new set of rules as recommended by their own Administrator, to replace an obsolete set which he admits does not fit the picture."

The CAA's engineering requirements are often arbitrary and faulty.

They are enforced by a routine that is so expensive in time and money if changes in an approved model are needed that many airplane manufacturers today simply cannot afford to go through it.

Recent research by NACA has shown that the old idea of testing airframes by conventional static loading of lead bags or by equivalent calculations is utterly fallacious because that is not the way the loads are distributed on airplanes in flight. The errors of the CAA formulae are further compounded by the aeroelastic bending of structures which takes place under the maximum loads met in flight. CAA engineers spend days and weeks fussing about a two per cent error when their fundamental assumed structural loads may be off 20 per cent or more.

The rules are frequently arbitrary and capricious. Once a prominent CAA official was flying an airplane when the elevator cable broke. He avoided damage to his plane in landing by use of a particularly large trim tab. That impressed him so much that he prevailed upon CAA to change its specifications to require oversize trim tabs on lightplanes. These trim tabs are fine for landing if your elevator cable breaks—which probably has happened only once or twice since the CAA official's mishap—but they have killed scores of unsuspecting private pilots because they can cause fatal stalls when the pilot suddenly opens his throttle during a landing approach.

The problem was exactly stated by Grover Loening addressing the Institute of the Aeronautical Sciences at Dayton, O., early last fall:

"The aircraft concept that we have allowed to grow is that no airplane can be sold and flown in interstate commerce unless it has been through (*Continued on page 62*)

CAA certification rules freeze airplane designs and hinder improvements.

By CURTIS FULLER
Editor of FLYING

SHOULD CAA CERTIFICATE PERSONAL AIRCRAFT?

Thomas K. Finletter
Chairman, President's Air Policy Commission

"The present testing procedure now executed by the CAA should be conducted and sworn to by the manufacturer . . ."

T. P. Wright
Former Administrator of Civil Aeronautics

"Okay, except that any part which doesn't meet our standards, we can still make you change . . ."

Delos W. Rentzel
Present Administrator of Civil Aeronautics

Will a rewritten and abbreviated Part 03 really solve the basic problem?

Grover Loening
Engineer and Aeronautical Consultant

"The automobile industry . . . proves . . . that 'the survival of the fittest' is the best check-up of a stress analysis . . ."

John T. Griffin
President, Massachusetts Aviation Trades Association

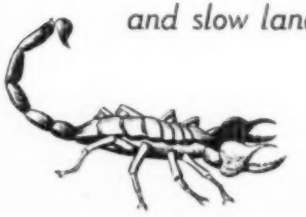
"We have the picture of the CAA choking to death the very progress it is supposed to encourage . . ."

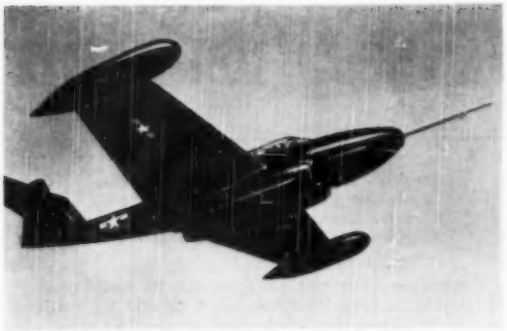
Northrop XF-89 is prototype of Air Force's new jet night fighter. It has two-man crew, carries heavy radar, weighs 30,000 pounds-plus.

Jaw-like control surfaces on XF-89 are "decelerons." They combine the functions of ailerons, brakes and landing flaps.

NORTHROP
Scorpion

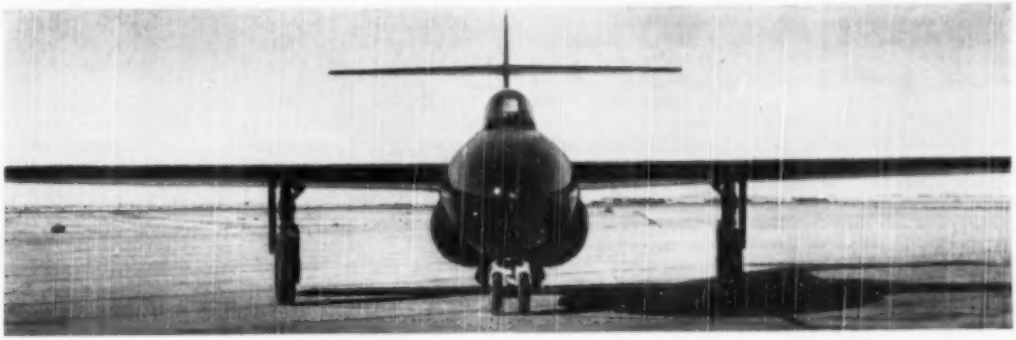
Air Force's new night fighter combines high operating speeds with straight wing and slow landing.





Underside of XF-89 shows "pod-type" mounting of engines beneath belly. Craft has two Allison 4,000-lb. thrust J-35's.

High-rearing tail of XF-89, resembling a scorpion about to sting, helped give plane its name. Height of tail is 15 feet.



Frontal view of *Scorpion* shows clean lines and high mounting of tail surfaces which raises them above jet blast and wing turbulence.

THE SECOND of the venomous night-fighting *arachnids* to be produced by the Northrop Aircraft Company is the twin-jet *Scorpion*—a 600-m.p.h.-plus successor to the twin-engined *Black Widow* of World War II. Listed F-89 in the orderly series of numbers that the U.S. Air Force assigns to its airplanes, the *Scorpion* emphasizes in the details of its design the enormous progress that U.S. fighting planes have made since they turned to turbojet engines for power.

In the mid-1930's the 30,000-pound-plus gross weight of the *Scorpion* would have sufficed for a heavy bomber. It is more than the medium bombers of World War II, and more than such familiar aircraft as the once-monstrous DC-3. It packs four times the gross weight of the smaller fighters of World War II and twice that of its sister fighter, the *Black Widow*, though it is actually smaller, dimensionally speaking. But a night fighter has to pack a load. It has to have more range than comparable day fighters and jets are prodigal of fuel. It must also carry considerably more electronics gear, including heavy radar detection equipment for closing on its quarry.

Aside from the somewhat morbid desire of the Northrop Aircraft Company to name its planes after poisonous members of the *arachnid* class of *arthropods*, which includes the spiders and scorpions particularly, the F-89 is aptly named the *Scorpion*. The after section of the fuselage is slender and gracefully tapered to the tail, which rears high, somewhat like an angry scorpion about to sting. To continue the allusion, however, is bound to end in disappointment because the *Scorpion* does not carry its venom in its tail.

By mid-summer, the first production model of an initial order of 48 *Scorpions* will be rolling off the lines of Northrop Aircraft, Inc., at Hawthorne, Calif. The plane is black-painted, lethal-looking, with two characteristics that are especially distinguishing appearancewise. The horizontal stabilizer is placed fairly high up on the vertical stabilizer to lift it above turbulence caused by air passing over the wing and the blast from the engines. It is this assembly, together with the tapering after-fuselage, that comprises its non-poisonous tail. The second characteristic is the mounting of the two Allison J-35 4,000-pound thrust jet engines in pods on the belly of the fuselage.

Despite the pod-type mounting, however, the *Scorpion* is an exceptionally clean airplane. The two engines have air intake ducts on either side of the fuselage in front of the leading edge of the wing. The tail pipes are beneath the fuselage a few inches forward of the trailing edge of the wing. The wing is shoulder-mounted, squared at the tips and has only a few degrees of sweepback—not enough to have any effect on transonic speeds. The canopy is neatly faired into the fuselage.

The *Scorpion* is designed to operate at altitudes over 40,000 feet, and although official performance figures have never been revealed, it is known to be capable of flight well over 600 m.p.h. Maximum range of the F-89 is strictly guarded by security, but considering the weight of the plane and requirements for an all-weather fighter, it is probably on the order of at least 2,000 miles.

Northrop engineers have attained the high-speed performance of the F-89 by (*Continued on page* 58)

Hy Sheridan

FLYING's contributing editor, Hy Sheridan, says piloting a DC-6 is like steering a tug boat. But when an airline pilot buckles on an Ercoupe, he's in for some new experiences.

WHEN THE EDITOR of this elegant rag asked me to go out and fly some lightplanes and tell our readers about them, I didn't know then what he was up to. He was about to reduce the internal pressure of a great airline pilot, a noble animal indeed, something like a moose.

I put on a clean shirt and a look of importance and closed in on an airport just north of Chicago.

"Sure," the man replied, "We have an *Ercoupe* that we don't need."

The very idea! I drew myself up and put on my air of hauteur—I am hauteur or colder by turns—and I said to him, "See here, my good man, I am a DC-6 wrangler and I guess I am capable of flying your airplane which to me is hardly more than DC-¼!"

"Wait a minute," he cut in. "I didn't mean not any more. I meant that we can spare it this afternoon."

Somewhat modified, as Sadie the Stewardess puts it, and wishing to take off in an *Ercoupe* instead of a hufl I asked him to get a safety pilot to go along, for the company.

I met the safety pilot, whose face had the same expression as a banker who had just been asked for a loan. He led me to a plot of ground in front of the hangars where were hobbled all kinds of planes. "This is ours," he said.

"That's nice," I commented. "Where is the one we fly?"

"This is it."

"Oh, I thought that was a model." It was darn cute, though.

I held it steady and climbed into the pilot's seat, sitting down easy. I thought that the plane was not very strong. Well, before the day was over that little *Ercoupe* surprised me and I'll wager my bottle of chest-hair tonic that I surprised it.

We started the engine and taxied out from the line and warmed up its cockles. I thought we could warm it up just by looking fondly at it but he said no, you had to run it. Then the safety pilot showed me where to taxi to the gravel runway.

The *Ercoupe* was very easy to taxi because it has a nose wheel that steers. The trouble I had was with the rudder pedals. There weren't any. I seemed to have two extra feet.

We got to the near end of the runway and Ol' Banker Face signalled to head her down it. "Take her off," he said.

Off the other end of the runway was a line of tall trees. I took a look at that little engine swinging that Malacca prop, and then I took a gander at the wind sock and I saw that we were going to take off down a 15 mile wind. We would never clear those trees; not a chance. I chuckled to myself. It was his airplane. I'm a humorist, you know.

I pushed the throttle knob and the little engine started humming—"When the Roll Is Called Up Yonder," I think it was. But the darned little *Ercoupe* surprised me. She just clicked her heels and took to the air and we climbed so far above the trees that they looked like bushes.

And then I became conscious of an odd thing. The nose would go up and I would catch her with the flippers whereupon the nose would duck down again and I would catch her once more, and that sort of thing kept going on.

Now let me say that I have been flying DC-4's and DC-6's for several years and when you want the nose of one of those planes to go up you take a deep breath, brace yourself, and heave back. After awhile it rises kind of deliberate, like a dowager getting up out of a chair, both overstuffed. You allow for the time it takes, sort of lay plans as it were, and it works out all right. It's like steering a ferry boat. But with these little babies when

"I didn't measure the landing run but when we stopped I could spit to where we touched down."

Flies the Lightplanes

An airline captain gives his impressions of puddle-jumpers.

"I leveled out at 16 feet like I do in a DC-6. That's too high for an Ercoupe, but the puddle-jumper just sighed and sat down like a feather."

you want to nose up you don't actually do anything—so I found out a few days later. You just think, "nose up," and up she goes, quick. Even then I was still overcontrolling a little until I mastered the art of thinking in a whisper.

But I hadn't learned that technique yet and the *Ercoupe* was doing a roller-coaster around the skies until I wondered if I hadn't better try to post. Yelling whoa didn't do any good. I tried that. Ol' Banker Face reached over and throttled her down. "Might as well save gas," he said, "if you're going to scull her."

Was that any way to talk to an outstanding airline pilot? I ask you. Before the flight was over I earned his respect, though. "Boy," he gasped, with rapt admiration in his eyes, "are you active?" It wasn't a question. Ol' Banker Face took over and flew her a bit so that I could get my breath, and she went along sweet and quiet like a hammock after dinner. I fell in love with her except for that one thing and I had a girl like that once—every time I touched her myself, she jumped.

One of the things I had to find out about was stalls. More pilots have ended up in stalls than horses—or husbands for that matter. To test stalling characteristics of these planes I wanted to know about inadvertent stalls, not acrobatic stalls, the kind that might slip up on a novice pilot or a fellow caught by weather.

First I tried a straight-away stall, the kind that you might get into when stretching a glide. I eased back on the wheel until it was all the way back. We mushed along with no tendency for the nose to drop. The ailerons gave excellent control. No more could be asked.

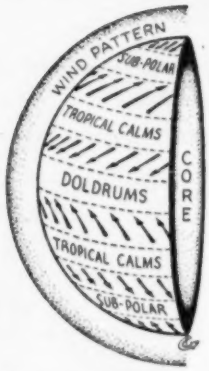
I then tried the same thing with the power on, the kind of a stall we might have when trying to climb too steeply. Again the plane remained level, and we were losing little if any altitude.

Steep turn stalls were then tried, power on and power off, right and left. These stalls are the hey, Mable, look at me type. There was no tendency for the nose to drop. The ailerons would roll the plane out level with prompt response. If the *Ercoupe* hit the ground in a stall it seemed to me that it would be flat when it did and not nose down. It is hitting nose down that discourages a fellow.

Another fine characteristic was that a slight movement forward of the wheel would instantly stop the stall and give nose control again.

(Continued on page 66)

AVIATION'S NEW FRONTIER:



In the troposphere—the region of weather—the winds blow in the pattern above.

The Outer Atmosphere

What is it like up there where the stars burn in a black sky and the air is too thin to propagate sound waves?

THE FUNERAL of Britain's Queen Victoria in 1901, oddly enough, inspired the beginning of serious research into the upper atmosphere. As part of the solemn rites, a series of cannon was fired at one-minute intervals. The sound of these guns was alternately audible and inaudible in concentric zones around the source. When this fact became known later there was much speculation about its cause. Scientists went to work and various theories were advanced and rejected. Finally they decided that there must be a high temperature region at the 20- to 40-mile height which caused this atmospheric phenomenon.

Today, high sounding rockets are verifying or disproving the facts and theories turned up in a half century of learned speculation about the composition of the upper atmosphere where no man has ever been and where the stars burn bright in a black sky. One of the greatest concentrations of brains and effort in scientific history is today being spent in learning the characteristics of the upper air. Knowledge is growing so rapidly that scientific concepts about what it is like "up there" change almost from year to year.

Most of the data in the accompanying chart, and in this article, was gathered by Howard E. Roberts, Aero-Thermodynamics Engineer of the Douglas El Segundo plant. It is based upon the latest information available in 1949.

The chart exaggerates man's efforts to explore the atmosphere in person. The greatest altitude that men have reached is still the record set by Anderson and Stevens in 1935 — not quite 14 miles. But where man is unable to go in person he explores by other means. He sends sensitive instruments aloft which transmit radio messages of their findings. He uses radar to study the trails of meteorites. He seizes on radio to study the free electron layers in the atmosphere. He makes visual and spectographic studies of the aurora and lights of the night sky to determine the composition of the atmosphere at great altitudes.

LEVELS OF THE ATMOSPHERE. The earth's atmosphere today can be thought of as consisting of four concentric layers of gas. Transition between them is gradual without sharply defined boundaries.

1. *The Troposphere* is the first layer. It extends from sea level to about 35,000 feet at middle latitudes but varies from 54,000 feet at the equator to about 28,000 feet at the poles. It contains about three-fourths of the atmosphere by weight. The troposphere is composed of approximately 4/5 molecular nitrogen and 1/5 molecular oxygen, with traces of some other gases.

2. *The Stratosphere.* The transition area between the troposphere and the stratosphere is called the "tropopause." The stratosphere itself extends to an average altitude of 60 to 70 miles and contains less than one-fourth of the atmosphere by weight. In its upper levels exists a high temperature region which is sometimes called the "ozonosphere." It is caused by a concentration of ozone which absorbs solar ultra-violet radiation. The stratosphere is similar to the troposphere in composition.

3. *The Ionosphere* contains about 1/3000 of the atmosphere by weight. It is characterized by free electrical charges caused by radiation. Some of the gaseous particles of the ionosphere are broken down into ions and free electrons by absorption of the ultra-violet radiation from the sun. This also causes a dissociation of oxygen and nitrogen molecules into their atomic forms and creates very high temperatures.

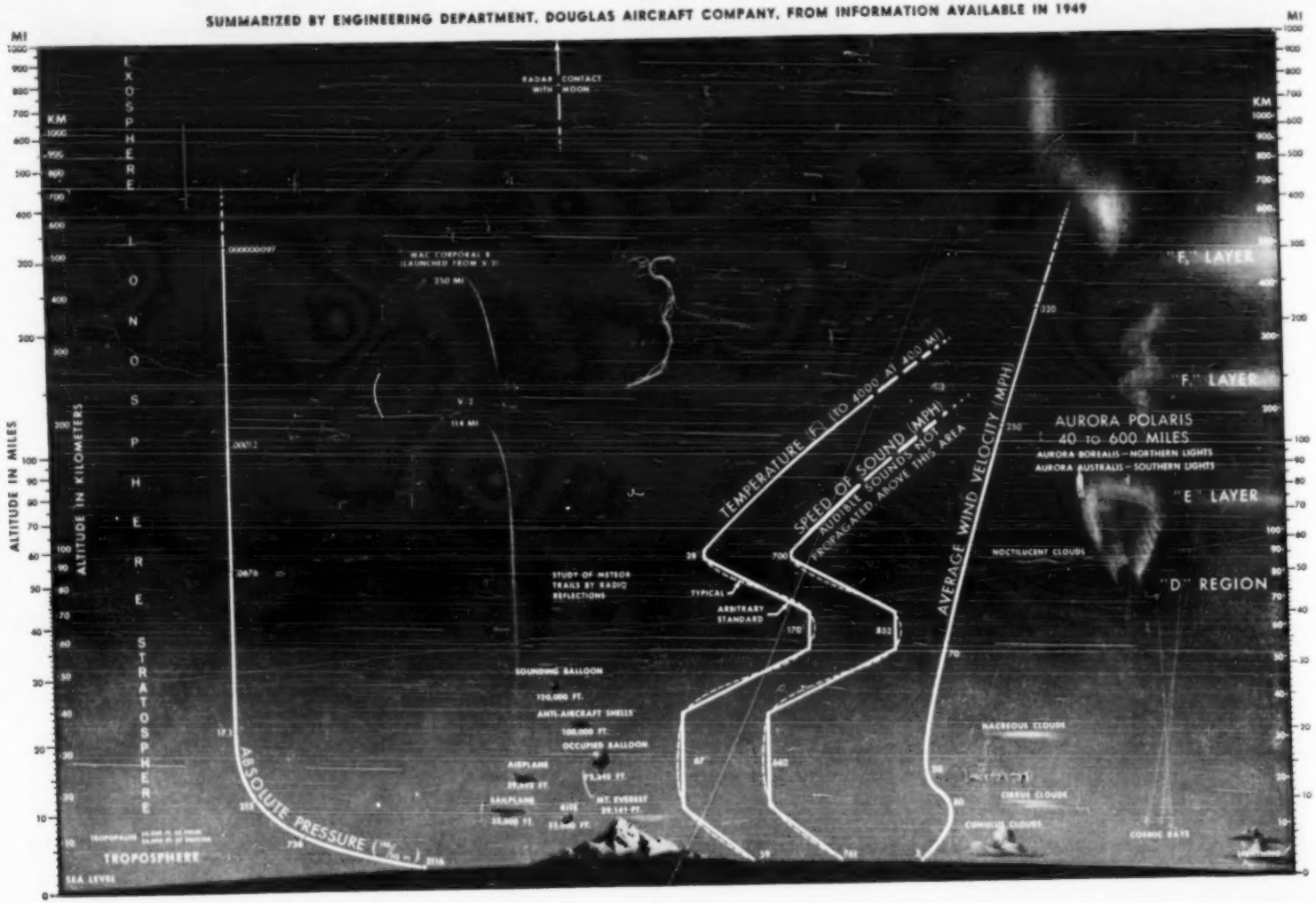
4. *The Exosphere* is the outermost layer of the atmosphere and is so unimaginably tenuous that it consists of only one hundred billionth of the atmosphere by weight. This fringe layer of the atmosphere, on the edge of space, is occupied by gaseous particles whose motion is relatively unhampered by collision with each other. Their atomic speeds would permit them to go rocketing off into space except that those speeds are less that the velocity of escape from the earth. And so the earth's gravity holds them in the atmosphere.

WEIGHT AND PRESSURE. The atmosphere is approximately one-millionth of the weight of the earth and it is pressing down upon the earth's surface with a weight equal to about one ton per square foot at sea level. The increase in pressure only 34 feet beneath the surface of a fresh water lake is equivalent to the pressure developed by the entire height of the earth's atmosphere.

Pressure falls rapidly at first with increasing altitude above the earth's surface. At (*Continued on page* 60)

CHARACTERISTICS OF THE EARTH'S ATMOSPHERE

SUMMARIZED BY ENGINEERING DEPARTMENT, DOUGLAS AIRCRAFT COMPANY, FROM INFORMATION AVAILABLE IN 1949

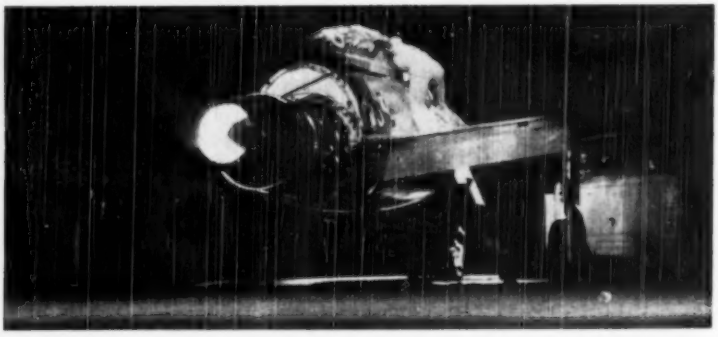


Thunderjets of 33rd Fighter Group have flown more than 10,000 hours in 11 months of operation.

1 **Preventive maintenance** assures high availability of *Thunderjets*. At Otis there are daily inspections, plus 25-, 50- and 100-hour inspections. Tail sections (above) are removed at 50-hour periods. Since 1947, engine change period has increased from 10-25 to 200 hours.

2 **Allison J-35** engine is removed to repair trouble in accessory section. Complete engine change takes 50 minutes.

6 **Armament specialists** Carter Shanklin and Gilbert Clark reassemble one of plane's six .50-caliber M-3 machine guns.

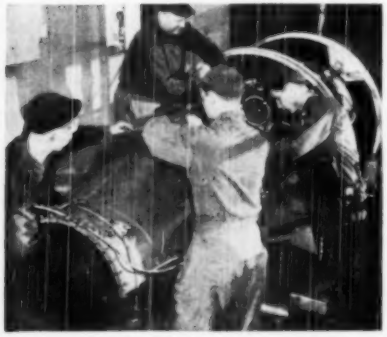


7 **Inspection completed** and the F-84's new engine installed, the crew chief fires her up for an operation check. Night scene shows flames bursting from tail cone of J-35 jet engine. It will now be good for another 200 hours and 100,000 miles of near-sonic flight

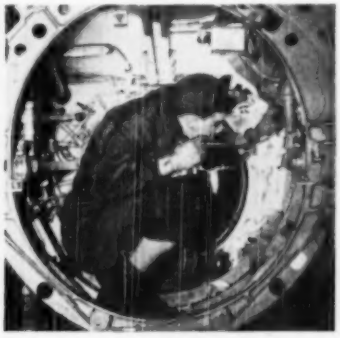
OVERHAULING THE THUNDERJET

Hardy crewmen at Otis AFB repair Republic F-84's out-of-doors.

THE DIFFICULTIES and problems of taking a new type airplane fresh off the assembly line and putting it into operational service can only be hinted at in the pictures on these pages, taken at Otis Air Force Base on Cape Cod. First, there is the enormously difficult and responsible job of training and retaining crewmen to check, maintain, and overhaul the complicated new planes. Evidence of the accomplishment is the fact that *Thunderjets* have flown more than 65,000 hours operationally and the period between engine changes of the J-35 Allison has increased from 10-25 hours at the beginning to 200 hours with the 33rd Fighter Group pictured here. It actually is 300 hours with one other fighter group. Those 200 hours of flight represent 100,000 miles in a plane which has about 7,000 feet of electrical wiring, 1,500 feet of tubing, and 150 feet of rubber hose. The *Thunderjet* has 315,000 rivets and 165,000 individually fabricated parts. Yet crewmen of the 33rd do all the maintenance and service work out-of-doors because the two small hangars available at Otis have room only for major airframe teardowns and repairs. The 33rd is one of five *Thunderjet* groups in the United States. It was formerly based at Roswell Field, N. M., and was moved to the Cape Cod base, a wartime Naval installation, in December of 1948. Facilities at Otis are not readily adaptable for jet fighter operation and the accomplishments there are a tribute to the crewmen of the U. S. Air Force. When their operation is all put under roof they will aim at the 300-hour engine overhaul mark. END

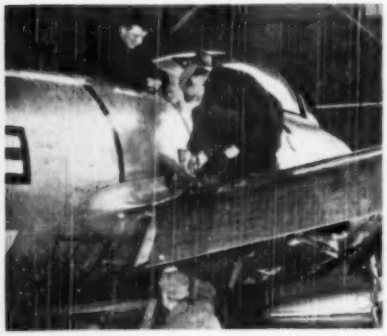


3 **After 200 hours,** crew removes tail cone. Burning cans, compressors, nozzle, bucket wheel and shaft will also be checked.



4 **Accessories** are inspected. Each Thunderjet has about 7,000 feet of wiring, 1,500 feet of tubing.

5 **Buckets** get the once-over. Cpl. James W. Kelso, Duluth, Minn., inspects each blade of the turbine wheel for cracks.



8 **After run-up,** airmen complete finishing operations. They install tail section and replace fairings and inspection doors.

9 **Ready to roll,** the pilot clambers aboard and crewmen retire to the line. Plane is now ready for engineering test flight.

10 **"She flies** like a charm," 1st Lieut. Stanton D. Converse, the test pilot, tells Crew Chief Henry L. Minch.

Air Force on

TURK AIR COMMANDER

Short, grizzled, four-star Gen. Zeki Doğan is commanding general of the Turkish Air Force. A veteran of the Turkish war of independence, he is a hard driver and follows U. S. methods.

Determined to resist aggression, the Turks build an air force with U. S. aid.

Russia's Border

By T. V. GRAVES

LIEUTENANT Ahmet skimmed his Republic *Thunderbolt* 20 feet above the ground on the bombing run, released one bomb which skipped into the target, and roared out over the Sea of Marmora. A second F-47 followed, and another and another.

And down in the southern part of the country, Turkish bomber pilots were putting American B-26 twin-engined bombers through their paces on bombing and gunnery ranges.

The Turkish Air Force, most powerful in the Middle East, is fast becoming a hard-hitting fighting force equipped with U.S. planes and financed in part with U.S. dollars. American planes and a military mission are in Turkey for one reason: to furnish materiel and know-how to a nation determined to preserve its independence of the U.S.S.R.

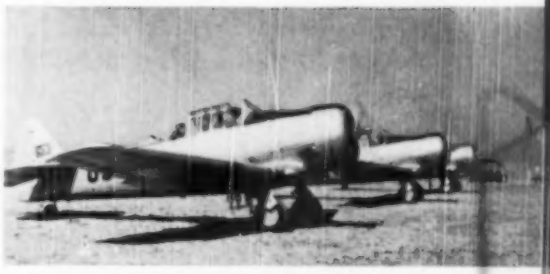
Turkey and Russia have a common border, and the Soviet Union lies ominously across the Black Sea with a traditionally lustful eye on the Dardanelles. The Turkish Air Force with U.S. backing is determined to oppose any predatory U.S.S.R. moves in this direction.

Commanding General of the Turkish Air Force is short, grizzled, four-star General Zeki Dogan (pronounced Dowan), a veteran of the Turkish war of independence. A hard driver, General Dogan keeps his officers on their toes and insists on the highest possible standards for his command.

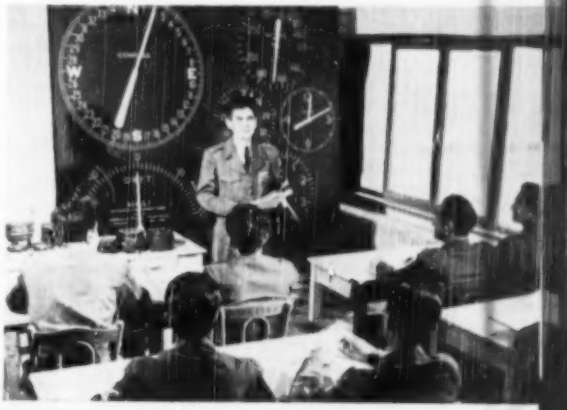
The Turks still have a relatively large number of British planes in addition to the American planes delivered. They have American F-47 and British *Spitfire* squadrons; American B-26 and British *Mosquito* twin-engined bomber squadrons; British *Beaufighter* twin-engined reconnaissance planes; American C-47 transports; American T-6 trainers and British *Magister* single-engined trainers. They also have American T-11 twin-engined trainers. British planes formed the core of the Turkish Air Force until about two years ago, when U.S. aid started.

The country is extremely security-minded and hasn't revealed the exact number of personnel in its Air Force. Primary reason for this extreme security is the closeness of Russia and the jealousy with which Turkey guards its long control of the Dardanelles, the only entry to the Black Sea.

The Turkish Air Force, as its Army and Navy, is composed of three groups of servicemen. There is one group of career professional officers and a second group of career non-coms. Many pilots are sergeants, although there are restrictions on their flying and they are not permitted to command flights or elements. The third major group comprises enlisted privates, who are conscripts. Since Turkey has been on a wartime footing for years, these men remain in military service for three or four years—and privates receive 62 kurus a month (about 20 cents). Men with college degrees go to officers schools and become third lieutenants—and serve a shorter hitch. But the non-college graduate (*Continued on page* 61)



American T-6 single-engined trainers are used by Turkish Air Force at field near Eskishir. The Turks also fly many British aircraft.



Navigation classroom is equipped with U.S. training aids. Some junior officers had to learn English in order to use the devices.

American surplus planes like this T-11 trainer are delivered by U.S. carrier to Turks at Istanbul. Turkey also has a number of F-47's, B-26's, C-47's and T-6's.

Adventure OVER Bloomington

By ED HOADLEY

IT WAS late afternoon in southern Indiana toward the last of August. A few cumulus clouds slowly melted against the back-drop of blue sky and sun-drenched hills. Pilots and students lazed in the shade. The heat smothered the usual hangar talk.

Three very tired Aeronca *Champions* that had just returned from a cross-country flight to Wyoming simmered on the flight line. One of these roared its little four-cylinder resentment at the instructor and student who presumed to interfere with its rest. Nevertheless, old NC82506 turned her nose to the wind and picked up flying speed down the turf.

Leon (Red) Geer, the instructor, relaxed in the rear seat. Joseph Beam, his new student with one hour's total flying time, sat in front of him attempting to follow through on the controls. Leon was a lanky six-footer, typical ex-Navy night fighter-pilot.

Slowly the trainer lifted in the thin, hot air. Harold Hagan, in charge of the flight line, was making idle conversation with the pretty secretary in the pilot's lounge. Leaning against the door jamb, he languidly watched the trainer complete its take-off. Suddenly he straightened up and with a yell started running to the nearest airplane.

Startled, the other boys looked up at Red's plane. The

Leon (Red) Geer was killed practicing aerobatics for the Miami Air Maneuvers shortly after the incident described in this story.

Only one man thought a crash could be avoided and he was outside hanging on the struts.

Collapsed gear is surveyed ruefully by student pilot Joe Beam, shortly after emergency landing.

Slight damage was sustained by plane in landing, despite battered appearance in photo above. Wingtips weren't even scratched. Instructor Red Geer stands at left.

"With 2,500 feet of nothing but thin lift struts between him and eternity . . . and with a new student at the controls, Red was just sitting there grinning."

left landing gear and wheel assembly were hanging almost vertically below the fuselage. As soon as it had become airborne, the oleo assembly (inner sleeve), which is bolted inside the landing gear Vee case-frame, had parted from its bolt. Wheel, axle, axle-strut, and oleo assembly were now dangling in the air some two feet below the fuselage.

The case-frame, firmly bolted to the fuselage at its upper end, stuck out from the airplane in its normal diagonal position. Evidently some previous hard landings in Wyoming had ripped the bolt holes away from the bolt and the assembly had been ready to slip out at any time. All of this was apparently unknown to Red and Joe who left the traffic pattern and prepared to practice elementary maneuvers.

Hagan jumped into another Aeronca and immediately took off to warn Red. The secretary meanwhile had called another airport and they had promised to send up a warning plane. With much waggling of wings and pointing of arms, these two pilots were able to draw Red's attention to his dangling gear.

I had just driven up to the hangar and was quickly informed of events. Something had to be done and fast. Rushing to the telephone I called the local fire station, an ambulance, the sheriff, a doctor, and as an afterthought, the coroner. What tragedy might ensue I did not know.

As fast as each unit arrived, we stationed it up and down the long northeast-southwest runway at intervals of 200 feet. The fire truck and crash truck were placed half-way down the field to be able to check any flames that might start and to remove the boys without delay. We were sure that the landing gear would act as a plow and throw the airplane on its back. We hoped that Red would foresee all these dangers and allow us time for preparation. We underestimated Red.

All of the 15 minutes we had consumed in preparing for his arrival, he had been cruising at 2500 feet over the airport. We thought he was watching our preparations and figuring out a crashlanding technique. We learned later how wrong we were.

After the warning of danger, Red sat up and studied for a few minutes. In the baggage compartment behind his seat were the few tools usually carried on cross-country flights for odd maintenance (Continued on page 52)

Lunchtime in High Sierras. Author has flown *Cub* on skis into snow-covered 8,000-foot meadow. He often takes sleeping bag and camping equipment for overnight outings in hills. Plane saves hours of travel.

Tandem landing gear is built by Art Whitaker, Portland, Ore., for rough field operation. Below, *Cub* with gear has landed in Williams Meadow—typical of vistas opened up by "landing anywhere."

Altitude is 11,300 feet, yet Hodgkin was able to operate safely with his 85-h.p. *Cub*. In background is Mount Keweah. Author experimented carefully with his plane at altitude before landing in mountains.

I LAND ANYWHERE

You're wasting your time if you confine your landings to airports, author believes.

By JOHN W. HODGKIN

The author is a California photographer who was so impressed with the utility of liaison planes in the Air Force that he determined to use lightplanes in exactly the same way when he got out of service.

Sand bar in middle of San Joaquin River a few miles north of Fresno makes a suitable landing spot for author. Above is sand bar with S-line marking path of tail wheel. Below, plane on bar.

HOW OFTEN have you wished to ride upon a magic carpet that would carry you into remote and inaccessible regions? I have found that a lightplane can fly and land me at wild and out-of-doors places that otherwise could be reached only after hours or days of hard travel afoot.

Shortly after my separation from the Air Force in the fall of 1948 I built a set of skis which could be used with the wheels of my plane to permit operating from both concrete runways and ice and snow. With them I have flown into locations of ever-increasing altitude to check their snow and ice characteristics. Now, from my home in Selma, in south central California I can fly my Cub to beaches, deserts and mountains—especially the mountains—and in any climate.

Starting at Bass Lake, 3,500 foot elevation, I flew higher to 7,000 feet altitude at Huntington Lake, and then on up to various snow-covered meadows and lakes until I reached my highest point of 11,362 feet on Desolation Lake. I never experienced trouble of any sort and my take-off run never required more than 1,000 feet.

On several of these flights I carried foot skis in the plane and had great fun skiing on the wide open slopes or at the end of a rope behind the plane as it taxied over the frozen surfaces of Desolation Lake.

During the summer I made a number of flights into high meadows, one at 9,000 feet, with the normal wheel gear. Here the only smooth section was 900 feet long. With a girl friend I have flown to this meadow several times and spent wonderful days picnicking and swimming. The landing run was only 300 or 400 feet and take-off about the same. To do this even with special engine and propeller it is necessary to make a full stall landing and use a power approach. Take-off must be made in very tail-low attitude.

Not long ago a friend and I each flew our planes in to Rock Meadow and marked the 900-foot landing area with white sticks. My plane has had its 65-h.p. engine replaced with an 85-h.p. engine and operated without trouble even with two persons aboard, but his 65-h.p. plane was a little sluggish even though he flew solo. It performed well in the cool of the morning but not in the heat of the day.

In the mountain stream 50 feet from where we parked our planes we caught several nice trout. We hiked over to Dinkey Lake lying at the base of granite crags and encircled with green pines and had even better fishing luck. Bill soon had his limit while I swam and took pictures.

The success of these mountain flights has been very satisfactory to me. Only a few months ago my friends were asking me "what kind of flowers" I liked. Now they ask to come along with me.

Many smooth slopes offer landing possibilities. Several years ago a friend, Jack Yentzer in Sheridan, Wyo., showed me how he could land (*Continued on page 54*)

The Stewardess on Flight 301

Fly with Marie Jeanne Barrios to New Orleans.

1 **Stewardesses** Marie Jeanne Barrios (rear) and Jayne Kommer dress quickly in hotel room to catch Flight 301.

2 **By 9 a.m.** they've had a quick cup of coffee and take the airline limousine to Chicago's busy Municipal Airport.

3 **Arriving at airport,** Marie Jeanne and Jayne sign the "outbound" sheet on wall of airline operations room.

By LYNN H. BLACK

Associate Editor of FLYING

MARIE JEANNE BARRIOS, a vivacious 25-year-old brunette, is the kind of girl most men turn around to ogle. She's one of about 2,500 girls who preside daily over passenger flights of domestic U.S. airlines, who are called upon to do everything from heating baby bottles to swapping jokes with Alben Barkley.

When Marie Jeanne boards a Chicago and Southern DC-4 at Chicago Municipal Airport on Wednesday and Saturday mornings, she never knows who she'll meet in the next 5½ hours. On her way to New Orleans, via St. Louis and Memphis, she may listen to the Lone Ranger sing the praises of "Silver." She may, as happened recently, have to calm an unbalanced passenger who thinks his fellow passengers want to electrocute him. She may even have to explain aerodynamics to a schoolteacher from Iowa, airline transportation taxes to a Congressman from New York, or the operations of the DC-4's plumbing facilities to an engineer from Topeka.

But no matter who's aboard, she knows that, with another stewardess, she'll spend most of the 870-mile flight walking up and down the cabin, helping passengers, chatting, serving some 50 meals, cleaning up the galley, soothing babies, filling out flight forms, taking coffee to the pilots, answering questions, hanging up coats, passing out magazines—and so ad infinitum.

She knows that, before the plane touches down at New Orleans, she's likely to be called, by various passengers with various motives, "a sweet young thing," "sister," "hey, you," "darling," "Miss," and "Babe." She also knows that, true to the traditions of the corps, she'll answer each passenger with a smile and handle each situation with poise and efficiency.

When Marie Jeanne attended a convent, and later Louisiana State University where she studied music in 1942, she had no intention of becoming an aerial shepherd.

It wasn't until she tasted the boredom of a War Assets Administration job (as a "Deputy Regional Director of General Disposal") that she cast an envious glance toward the girls who earn their living by riding—and working—on airliners.

Then, late in 1947, she applied to Chicago and Southern Air Lines for a stewardess job, and entered into the complicated machinery which separates from about 150 monthly applicants the approximately three girls who are hired.

She spent an hour in Memphis (*Continued on page* 63)

4 **Flight 301's crew** (left to right, First Officer Glenn Darnell, Jayne, Marie Jeanne and Capt. John E. Maynard) board the DC-4 half hour before the 10:30 a.m. take-off.

5 **Before flight leaves,** Marie Jeanne takes down each passenger's name and destination. Above, she stops to talk with two women who are flying to Guatemala on vacation.

6 **Marie Jeanne serves lunch** to 50 passengers while Jayne sets up trays in the buffet. Quick teamwork enables the girls to serve and pick up 50 meals in less than an hour.

7 **End of the line.** After Flight 301 lands in New Orleans, Marie Jeanne checks through the cabin, makes out her flight report, then picks up her bag and heads for home.

8 **Stewardesses at home** discard glamor and put the emphasis on comfort. Marie Jeanne (above) relaxes with apartment mates, both of whom fly for C&S on Venezuelan route. Later that night, Marie Jeanne tours famed French Quarter with her date, Chapman Marshall, a co-pilot for Eastern Air Lines.

Inspection of the Trojan is easy and simple, facilitated by quick access arrangements such as the plane's front skirts which can be folded to expose engine hood.

THE EMIGH TROJAN

By BOB ARENTZ

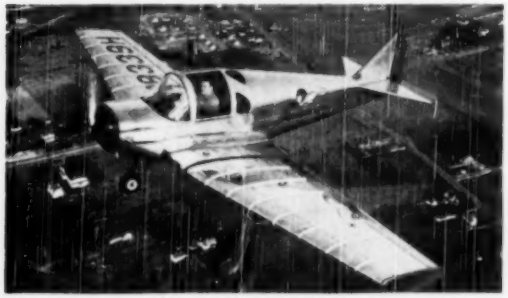
THE BANDY legged, barrel chested little Emigh *Trojan* seldom arouses lukewarm reactions. People either cry, "Ye Gods! what's that?" or they square off belligerently in its defense. "Handsome is as handsome does," they say, and vow with religious fervor that the plane has plenty of get up and go riveted to the constitution of a Sherman tank.

Unquestionably the *Trojan* is a sport in the genesis of airframe design. The wings have no ribs internally, the fuselage has nothing reminiscent of longerons, the wing spar is little more than a space maker, the motor mount is a cast magnesium bulwark riveted solidly into the front cowling, the wings are identical in all respects and can be used on either right or left side, and only five basic types of stiffeners serve all construction needs.

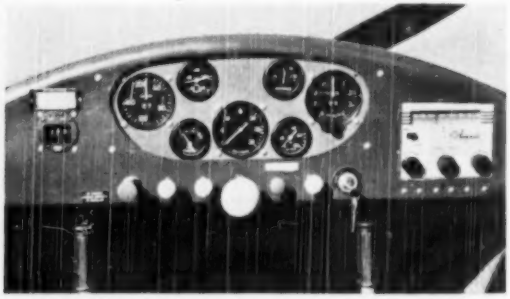
Ailerons, control sticks, rudders, wheels, tail surfaces — in fact, practically everything on the plane — is interchangeable with its counterpart.

I doff my battered Stetson to Harold E. (Pop) Emigh, Sr., for making the complicated science of airframe assembly look ridiculous. His job of production engineering has rendered the *Trojan* highest honors for design simplicity. The plane is as durable and uncomplicated as a piece of farm machinery. It has no secrets or hidden compartments. Emigh (it's pronounced as though he spelled it Aye-mee) didn't even try to hide the battery. Its right on the front of the fire wall in plain sight.

The *Trojan* has had a stormy, interrupted beginning. The idea of making the first all-metal two-place lightplane in America came to Emigh nearly 20 years ago. He

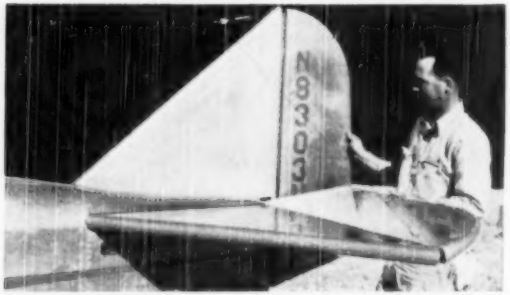


All-metal two-placer, Trojan cruises at 119 m.p.h., has a top speed of 130 m.p.h. on a 90-h.p. Continental. Price is $3,295.



Instrument panel layout is clean, unadorned. Kollsman floating panel is standard equipment as is auto-pulse electric fuel pump.

Rugged center section is riveted into fuselage section, with 28-gallon gas tank behind spar. Wings bolt onto outer flanges.



Parts are interchangeable. Note the similarity in shape of the plane's stabilizers, which are fabricated by Emigh on the same jig.

wanted to engineer for assembly line techniques. Experts have calculated that under a high enough production schedule the *Trojan* could be manufactured for the incredible figure of 121 man hours per plane. Under the pre-war price ranges of the late 1930's such a plane would have sold well under $1,000.

Emigh's initial project was almost completed 12 years ago when a premature and unauthorized test flight by a pilot without a parachute ended in tragedy. Five years of work, scrimping, worrying, dreaming were lost in an instant.

A second, two-place all-metal Emigh *Rocket* was then begun in Denver, but the approach of war found Pop Emigh instructing on a CPT secondary job, then running a big program of his own at Goodland, Kan., and, finally, in December, 1947, a grey-haired second lieutenant in the Ferry Command at Long Beach who put service to his country on a pilot's salary ahead of becoming rich as a fixed base operator.

When he left his job as check pilot on MATS' Pacific Division in the spring of 1946, then a major with over 1700 hours of C-54 time added to his other 6,000 hours, Emigh was just another ex-G.I. with a few bucks left and a hankering to make up for lost time.

He found himself weathering the stormiest skies of his 20-year career when he re-started his enterprise in California. But faith in the idea and in his own ability brought him into a safe landing at the Bisbee-Douglas airport located 10 miles north of the Mexican border in Arizona.

An aggressive county airport commission and capable airport managership by Grant MacCurdy gave Emigh the kind of backing he needed to salvage his basically sound design.

The little plane was given a (*Continued on page 56*)

Three-View Silhouette of Emigh Trojan

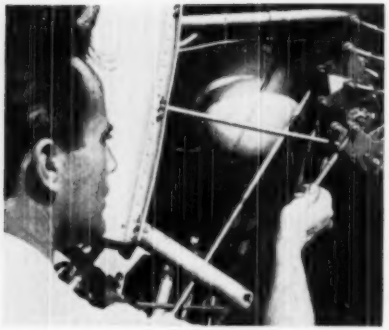
EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Type Certificate are flown. The authors evaluate each aircraft through the eyes of the average private pilot who flies an airplane for business or recreation.

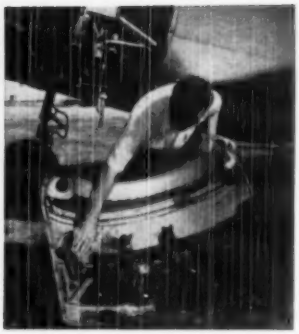
FLYING's CHECK PILOT

Demonstration by Uriah Wood, a Trojan dealer, shows sturdy wing construction. He habitually enters plane in this way.

Before flying, pilot should inspect front oil seal. Look for signs of exuded oil and oily stains on crankcase.



Check linkage, too, before each flight. Test it for play. Loose linkage will cause erratic engine response to the cockpit engine controls.



Efficient inspection requires removal of cowling. Check for cracks, broken fasteners, loose rivets and oil leaks.

Engines Are Too Good

Even the best engines need care if they are to operate properly.

By GILBERT CLOSE

"CAPPY" MATSON, World War I pilot with enough hours in his log book to polish each grain in the sands of time, watched the *Cub* scud down the runway and into the air. Fifty feet off, the *Cub's* engine missed once, belched smoke, then caught again with a steady roar.

"When I was a young 'un," Cappy said thoughtfully, "and an engine coughed like that, I'd lose no time in getting back on the ground to see what was the matter. Trouble now days, engines are *too* good. They're like the trusty old butler in a mystery novel—after years of faithful service, they can turn out to be a killer."

CAA statistics bear out Cappy's soliloquy. A careful study of the figures reveals that altogether too much over-confidence is placed on engine operation. True, modern lightplane engines are as near perfect as engineers can build them—so near perfect, in fact, that trouble is a remote possibility. But it is this remote possibility that eventually overtakes the unwary pilot.

As Cappy implied, there was a day when engines were less reliable and pilots were acutely engine-conscious. They expected trouble, watched for it, and lost no time in rooting it out when it occurred. An oldtime pilot would have brought that *Cub* back quickly and searched for the cause of the misfire. The young pilot went blithely on his way, seemingly unaware that engines are not built to misfire, and that when they do, something is wrong.

Of 1278 accidents caused by engine failure reported to CAA during a recent four-year period, 919 were operational failures and 359 were structural failures. Engine experts estimate that 60 per cent of operation failures can be prevented, and that 50 per cent of structural failures can be traced to excessive strains imposed on the engine during improper operation.

Taking it for granted that improper operation is 100 per cent preventable, a bit of mathematical wizardry reveals the astonishing fact that 730.9 of the 1,278 accidents could have been prevented. Even dropping the .9 of an accident leaves an accusing total. The 730 accidents cost 73 lives, 187 serious injuries, untold medical and hospital bills, and about $365,000 in repair bills.

What can the pilot do to increase his batting average? Where does he fall down in maintaining reliable engine operation? There are only three functions in which he can err: (1) his inspection techniques are faulty, (2) he is not operating his engine correctly, or (3) he fails to note or cannot recognize engine trouble symptoms.

The pilot who runs quickly down the pre-flight engine inspection form, giving each point just enough attention to justify checking it, is like a tourist who drives at breakneck speed. He'll get there but he won't see much along the way. The inspection form is merely a guide to prevent overlooking major portions of the powerplant assembly. If everything the *careful* inspector looks for in going over an engine were noted down, the inspection list would be many times longer than it is.

The note to check the propeller for blade injuries and looseness, for instance, requires more than a glance and a half-hearted wiggle of one blade. Take the prop in both hands. Shake it. Twist it. Listen for clicking sounds that indicate looseness in the hub mounting assembly, or a loose engine bearing. Rub your hands over the propeller surface to detect roughening of the varnish, wrinkling of the fabric, or lifting and loosening of the metal tips. Check the hub bolts to see that all nuts are safetied. Inspect the front oil seal for leakage.

Assume that during this rigorous inspection a slight roughening of the varnish is encountered on one of the blades. The roughness is not severe and would not interfere much with propeller efficiency. But it is an indication that something is amiss. (*Continued on page* 50)

TIPS FOR THE TROUBLE-SHOOTER

(*Indicates troubles the pilot can correct himself)

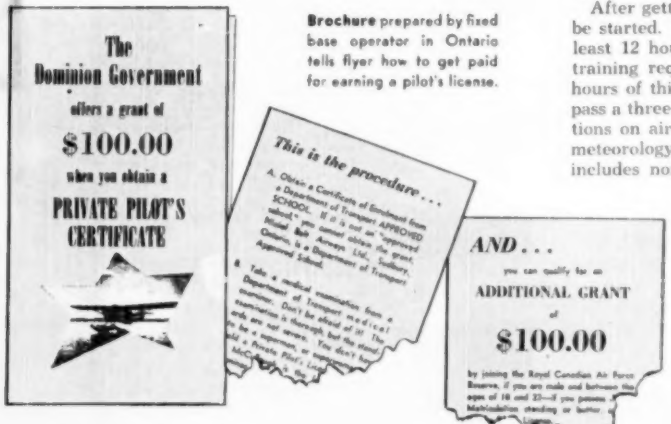
Trouble Symptom	Possible Cause
Engine Hard to Start	1. Out of fuel.* 2. Switch "OFF."* 3. Fuel valve control "OFF."* 4. Mixture control at "LEAN" or "IDLE CUT-OFF."* 5. Plugs fouled with oil.* 6. Plugs shorted by moisture.* 7. Over- or under-priming.* 8. Incorrect throttle setting.* 9. Air induction system leaking. 10. Engine out of time. 11. Moisture in radio shielding.* 12. Loose ignition couplings.*
Excessive Vibration	1. Propeller out of balance. 2. Loose engine mount.* 3. Bent crankshaft. 4. Improper rocker arm clearance. 5. Detonation. 6. Pre-ignition. 7. Improper air-fuel mixture.*
Loss of Power	1. Faulty carburation. 2. Faulty ignition. 3. Engine out of time. 4. Leaking induction system. 5. Fuel flow restricted.* 6. Dirty carburetor air scoop.* 7. Throttle connections loose or worn.* 8. Low oil pressure. 9. Engine overhaul required.
Misfiring	1. Sticking valves. 2. Defective spark plugs.* 3. Leaking induction system. 4. Improper air-fuel mixture.* 5. Wrong fuel.* 6. Fuel control valve not fully open.* 7. Clogged fuel vents.
Engine Overheats	1. Detonation. 2. Pre-ignition. 3. Mixture too lean.* 4. Overspeeding engine.* 5. Oil viscosity too low.* 6. Too low airspeed.* 7. Warped or burned valves. 8. Excessive carbon deposits. 9. Fuel octane number too low.* 10. Cowl flaps closed.* 11. Low oil pressure. 12. Obstructed cooling baffles.*
Excessive Oil Consumption	1. Worn connecting rod bearings. 2. Oil viscosity too low.* 3. Excessive oil pressure. 4. Faulty oil scavenging system. 5. Leak somewhere in oil system. 6. Continuous high operating temperature.
High Oil Temperature	1. Improper grade of oil.* 2. Diluted or contaminated oil.* 3. Oil supply low.* 4. Extended overheating of engine.
Low Oil Temperature	1. Engine not properly "warmed up."* 2. Insufficient protection of oil system during cold weather. 3. Mixture too rich.* 4. Defective oil gauge.
Loss of Oil Pressure	1. Broken oil line. 2. Defective oil pump. 3. Low oil supply.* 4. Pressure relief valve sticking open. 5. Plug out of oil pressure system.*
High Oil Pressure	1. Pressure relief valve spring tension too great. 2. Defective oil gauge. 3. Oil temperature too low. 4. Oil viscosity too high.*
Low Oil Pressure	1. Worn engine bearings. 2. Oil too low viscosity.* 3. Worn or defective oil pump. 4. Pressure relief valve spring tension too low, or valve sticking open. 5. Oil supply low.* 6. Oil temperature too high. 7. Defective oil gauge. 8. Leak in oil pressure system.
Engine Runs "Hot"	1. Fuel octane wrong.* 2. Lean mixture.* 3. Oil too thin.* 4. Retarded spark.* 5. Oil radiator core clogged.* 6. Leaky induction system. 7. Low oil supply.* 8. Over-speeding engine.* 9. Carburetor air heater "ON."* 10. Impeded air flow around cylinders.*
Excessive Fuel Consumption	1. Enlarged or loose carburetor jets. 2. Lodged carburetor float. 3. Float level too high. 4. Rich mixture.* 5. Over-speeding engine.* 6. Primer system leaking. 7. Fuel pressure too high.
Uncontrollable Rich Mixture	1. Fuel pressure too high. 2. Carburetor float level too high. 3. Loose carburetor jets. 4. Clogged air bleeds. 5. Screen in air scoop partially clogged.* 6. Primer valve leaking or defective.
Uncontrollable Lean Mixture	1. Fuel pressure too low. 2. Jets partially clogged. 3. Cracked induction system. 4. Clogged fuel line, vents, or strainer. 5. Vapor lock in fuel lines. 6. Engine not "warmed up."* 7. Carburetor air too cold.* 8. Excessive surging in fuel tanks.

Flying student Edith Jones, Toronto, will get $100 from Canadian government when she passes private exam. School will also get $100.

Canada's Plan For Pilot Subsidies...

By JAMES MONTAGNES

New Canadian plan provides cash payment for learning how to fly.



Brochure prepared by fixed base operator in Ontario tells flyer how to get paid for earning a pilot's license.

AS PRICES INCHED upward in 1948, lightplane flying in Canada creaked almost to a standstill. Few Canadians could afford the stiff cost of private flying courses. Even aviation enthusiasts with private licenses often were unable to pay for a few hours' flying time.

Commercial flying schools and clubs, unable to combat the rising costs, were in rocky condition.

And the surplus of war-trained reserve pilots for the Royal Canadian Air Force was diminishing each year.

To stimulate new flying activity and at the same time build a trained pilot reserve for the RCAF, the Canadian government decided to subsidize private pilot training.

First, pilot training courses were shortened, examinations were made less tedious, and new regulations were established for training schools.

Then the government provided for outright cash grants to students. The Department of Transport agreed to pay each flying student $100 when he passed his test for a private pilot license. If the student qualifies for the Auxiliary, Reserve or Active RCAF, he is paid another $100. Thus, flight training which ordinarily costs $350 is obtained for $150. Since the schools are also paid $100 for each student who successfully completes the three-month part-time course, these flight training organizations are able to keep training costs within limits.

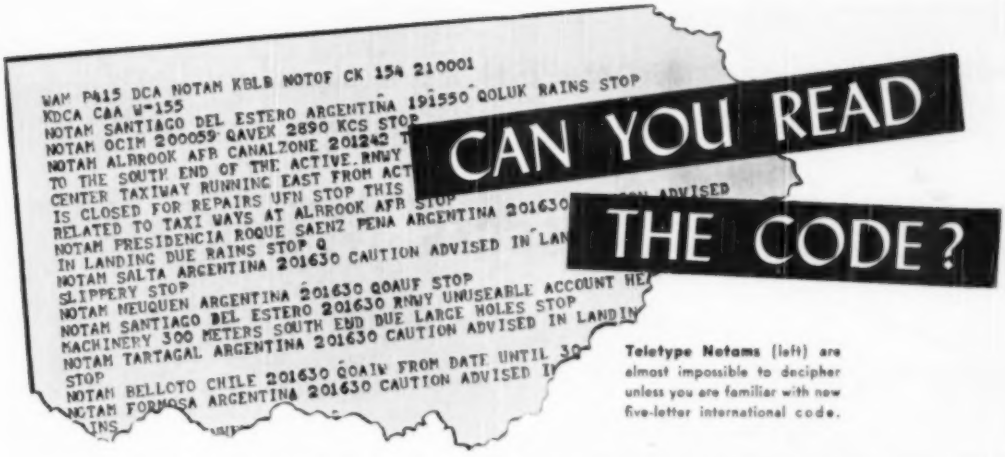
The plan went into effect on January 1, 1949. Under severe Canadian winter conditions there was little activity during the first few months. By September 1, the Department of Transport at Ottawa had signed 1,611 applicants for the subsidized course out of a total of 1,965 Canadian students taking training for private pilot licenses. At the end of eight months, 174 students had qualified for the $100 subsidy out of a total of 306 new private pilot licenses issued in that time. It is estimated that about five per cent of the successful students were women. A total of 88 flying clubs and training schools had qualified to conduct the subsidized training course.

First step towards the new plan was revision of the private pilot licensing standards. These were based on standards adopted recently by the International Civil Aviation Organization. New Canadian regulations provide for a student pilot permit and a new type private pilot license. To obtain a student pilot permit, the would-be pilot must be 16 years of age, must have passed a satisfactory medical examination, and have passed a written examination on air regulations, air traffic rules and Canadian air information circulars. He must also be a British subject or a citizen of a country which grants reciprocal aeronautical privileges to Canadians.

After getting a student pilot license, actual training can be started. Within a year the student must have had at least 12 hours of dual instruction of the total 30 hours training required under the regulations. At least three hours of this time must be solo cross-country. He must pass a three-part written examination including 250 questions on air regulations, air traffic rules and procedures, meteorology, navigation and airmanship. The flight test includes normal and emergency maneuvers appropriate to the type of aircraft used in the test. Unless the license is issued for non-spinnable aircraft only, there are tests to show ability to recover from spins.

A private pilot's license in Canada allows day or night flights solo or with passengers in approved aircraft which the pilot has flown solo. A private pilot cannot fly for remuneration, and he must pass a medical exam once a year. Licenses are not issued to persons under 17 years, though training can be started at 16.

Special forms (*Continued on page* 51)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INS
CAN YOU READ
THE CODE?

Teletype Notams (left) are almost impossible to decipher unless you are familiar with new five-letter international code.

By WILLIAM A. DIXON

The CAA's Notams aren't as complicated as they appear.

THE PILOT squinted at the yellow teletype sheet, laboriously traced the lettering, then shrugged his shoulders. He read the sheet again: "IND 8-24 RUNWY 31 CLZD TO LNDG DLGT HRS QOAUQ S AREA FLD."

Here's how the code word "QOAUQ" deciphers. The first letter "Q" indicates a code transmission. The second two letters "OA" are code for "land aerodrome." The fourth and fifth letters "UQ" are code for "hazardous due to repair or construction" (see accompanying table.)

Thus the complete message reads: "Indianapolis, August 24. Runway 31 closed to landings during daylight hours, and south area of field is hazardous due to repair or construction."

Every flyer ought to memorize at least a condensed version of the NOTAM code. These CAA Notices to Airmen (NOTAMS) contain just about all the pertinent data necessary to plan an intelligent itinerary. They contain information on the current status of all airports, field conditions, communications facilities, fuels available, lights.

Principal source of NOTAMS is the Airman's Guide, published every two weeks. But the CAA also maintains a supplementary teletype (NOTAMS) service, which is kept as up-to-the-minute as possible. Most pilots are acquainted with the Airman's Guide but many aren't familiar with the teletype NOTAMS which are posted in CAA Communications Stations and in Air Force and Naval Air Stations operations offices.

These teletype NOTAMS cover temporary or immediate changes which can't be kept up-to-date in the bi-weekly Airman's Guide. If radio facilities have power failures, if lighting facilities suddenly fail, if climatic conditions reduce the usefulness of an airport, the information is transmitted by teletype NOTAMS.

Prior to last March, these NOTAMS utilized abbreviations which were largely self-explanatory. But in March the code form was changed. And pilots, puzzled by the abbreviations, were known to follow the course of least resistance and ignore the new code.

At first glance, the new (*Continued on page* 55)

CONDENSED NOTAMS CODE

The following table decodes information important to everyday contact or limited instrument flying. For more complicated piloting or routes, the complete code table will be needed for reference and is always available at airport Weather Bureau and CAA offices.

• *Second and third letters*

RADIO AIDS

AF — Fan-type marker.
AH — Radio-beacon homing facility.
AJ — Radio range and voice communications.
AK — Radio receiving facilities.
AN — ATC approach control receiver (frequency/ies).
AP — ATC approach control transmitter (frequency/ies).
AR — Radio range.
AT — Attention signal.
AV — Voice communications (frequency/ies).

LIGHTING FACILITIES

IA — Boundary lights.
IB — Aerodrome beacon light.
IC — Contact lights.
IF — Flood lights.
IL — All landing area lighting facilities.
IO — Obstruction lights.
IR — Runway lights (number).

AERODROMES; SEARCH AND RESCUE

OA — Land aerodrome.
OL — Landing area.
OM — All runways.
OR — Refuelling facilities.
UL — Landing direction indicator.
UR — Runway number. . . .
UT — Turf landing area.
UW — Wind direction indicator.

• *Fourth and fifth letters*

HAZARD OR STATUS OF OPERATION

AF — Braking action poor.
AP — Work is in progress.
AU — Appears unreliable.
EC — Characteristics changed to. . . .
EN — Not operative until further notice.
EP — Available on prior permission only.
EW — Was not operative.
IK — Is available on request immediately or at . . . minutes notice.
IL — Hours of service are now. . . .
IT — Keep to runways and taxiways.
IV — Unserviceable until further notice.
OK — Resumed normal operation.
OM — Shut down for maintenance until further notice.
UA — Closed to all operations for (period of time).
UB — Closed to all operations until further notice.
UD — Closed to all night operations until further notice.
UQ — Hazardous due to repair or construction.
UR — Hazardous due to obstruction.

REPORT FROM
WASHINGTON

New study may eliminate 'mmft,' 'wow' and 'pfft' from radio vocabulary.

The CAA Dissects 'Mike Talk'

By RICHARD E. SAUNDERS
Washington Editor of FLYING

ONE OF flying's most irritating problem children is going to be psychoanalyzed. The CAA is doing a laboratory job on "mike talk" to discover why it sometimes plays strange pranks on pilots and control towers—why they frequently seem to be talking in different languages.

Often, what starts over the air as plain English ends up sounding like a cross between Russian and Hopi Indian. Pilots are apt to hear words like "mmft," "wow," and "ppfft" when they seek landing instructions. No one who has gone through such experiences thinks they are funny.

There is no doubt that difficulty in understanding the tower's orders has been a contributing factor in accidents. Either a misunderstanding of this sort or radio failure probably played a large part in the recent disaster at Washington National Airport when a P-38 piloted by a Bolivian rammed an airliner. The Bolivian gave one version of what he heard while the tower controllers said they had been transmitting entirely different instructions.

Jumbled communications also have drawn the curtain of mystery tighter around some crashes by scrambling the messages in which pilots tried to report the nature of their trouble. In one such case several years ago, the CAA even had a recording of the last message from the plane. But it has never been able to get any meaning from it—other than to determine that an emergency descent was being made

To find what is lousing things up, the psychological branch of CAA's medical service is going to give the airman's flight vocabulary a thorough laboratory workout. For the purpose of the study, it will regard words as the weakest link in the communications system; not the mechanical end of radio transmission, nor the human element.

Radios are better than they used to be even though there is still room for improvement, and not much can be done about the human element. Until a super race is developed, man's reaction time will be limited to a fairly narrow range between 180 and 200 milo-seconds. That is the speed at which the nerve impulses function.

It is not going to be as hard to put words through their paces as might be supposed. Malcolm McCormick, who heads CAA's psychological branch besides being well qualified in the field of psycho-acoustics, has a wealth of material upon which he can draw. Important contributions were made during the war by the Office of Scientific Research and Development through research conducted at the Harvard psycho-acoustics lab and other universities.

For example, the famous "ABLE, BAKER, CHARLIE, DOG" code was perfected to provide an easy method of spelling words out over the air when understanding was difficult. Each letter of the alphabet had its code word, picked for intelligibility under various noise conditions. It was found that the words selected retained their high rating of intelligibility when pronounced in different accents. They came out reasonably clear whether spoken in southern drawl, New England twang, or the flat tones peculiar to the mid-westerner; not to mention many other variations such as Brooklynese.

Another interesting bit of information turned up by previous laboratory testing work was that single syllable words are harder to understand than those with several syllables. This seeming paradox is due to the fact that words of more than one syllable have more tags of identification. This makes them harder to confuse. It was also found that certain sounds like the "f" in fox, the "th" in thin, and the "s" in sit are consistently difficult to understand.

Psychologist Malcolm McCormick is working on vocabulary of easy-to-understand words for radio use.

In mapping out his own program, McCormick has divided the work into three phases. First he is going to transcribe sample recordings from all of CAA's traffic towers and note the frequency with which certain words occur. Then he will test the most frequently used words in a laboratory he has rigged up and rate them according to understandability against background noise of varying degrees of intensity. Attention will also be paid to the accent factor.

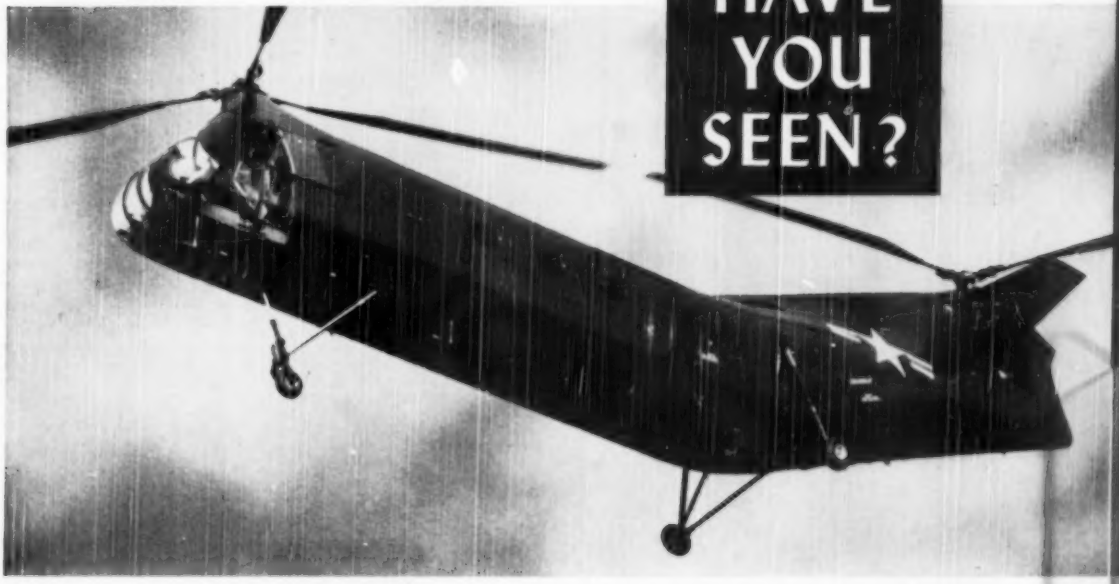
Finally he will attempt to find substitutes for words that receive the lowest rating. The whole project is expected to take six or seven more months. In the process, transcriptions will be made of mike talk coming in from both airline and private pilots.

As a result of preliminary work involving transcriptions from the control towers at Boston, Baltimore, Washington, and Oklahoma City, McCormick and his assistants have found that the vocabulary consists of 537 words used a varying number of times. As would naturally be supposed, the words used most frequently (barring the preposition "to" and the article "the") are "runway," "clear," and "over."

However, each tower had a few distinctive words of its own. Boston was the only (*Continued on page 58*)

HAVE YOU SEEN?

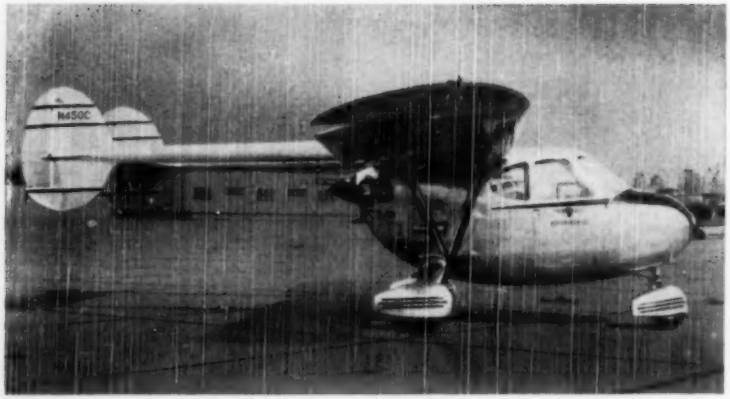
Piasecki HRP-2 is all-metal version of earlier fabric-covered HRP-1. Navy 'copter carries eight passengers plus pilot and co-pilot. More can be carried on short hauls.



Air Force Navion (Ryan L-17B) is equipped experimentally with skis attached to wheels for Arctic operations. Skis don't retract.

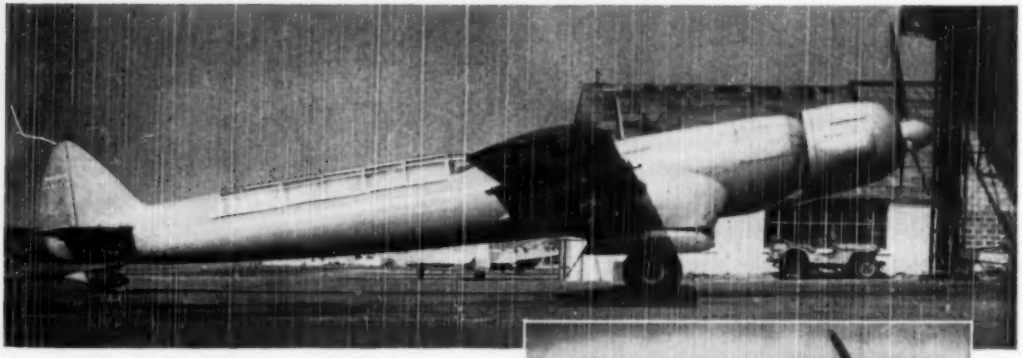
USAF XB-26F was photographed at Oakland Airport. It has air intake on top of fuselage and jet exhaust under rear of tail.

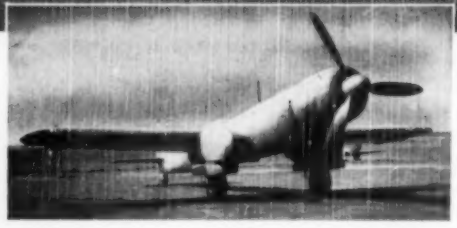
Hottest SNJ in U.S. is Wright Aeronautical Corporation's test plane being flown with new Cyclone 7 engine of 800 h.p.—about 200 h.p. more than conventional SNJ. Craft is used for flight evaluation of engine for forthcoming North American T-28 trainer.



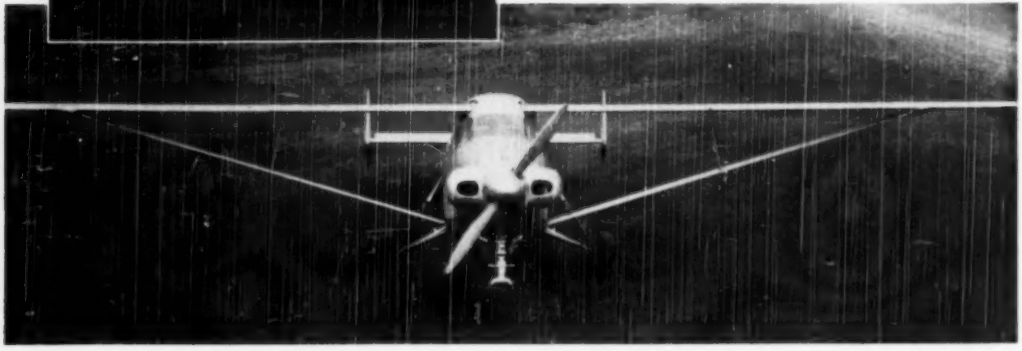
HAVE YOU SEEN? (continued)

Trella Special, new twin-boom pusher plane designed and built by Frank Trella, Detroit, former chief draftsman for Waco. It is two-place all-metal craft, 34-foot wing span, with 85-h.p. engine and 95 m.p.h. cruising speed.

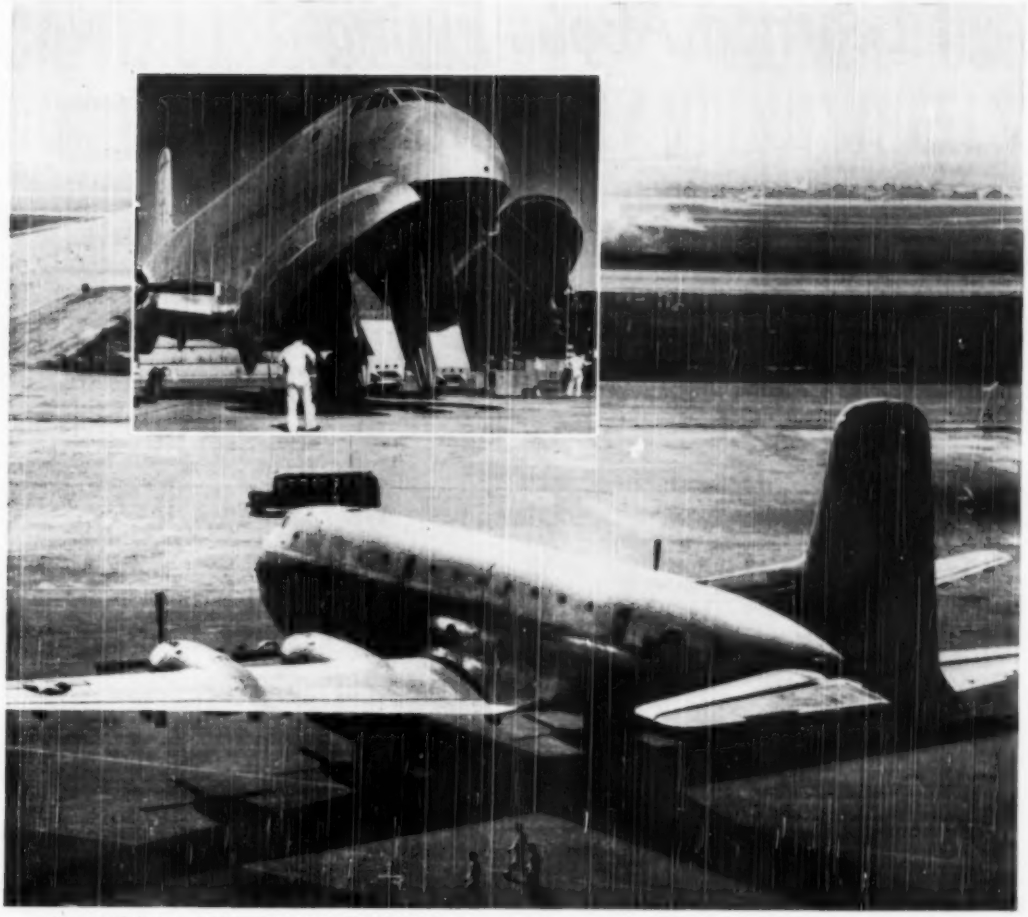




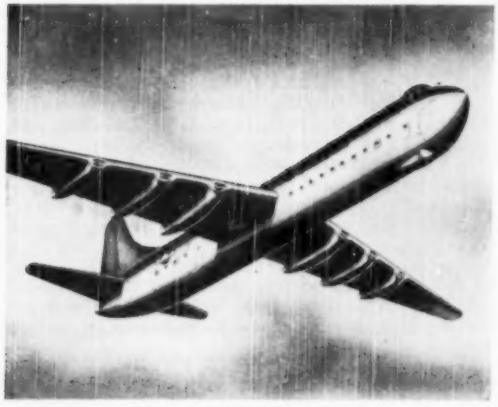
Unique French experiment is Makhonine MAK 123 variable surface monoplane. It has telescopic wing panels, with the outer sections of wings retracting into inner sections.



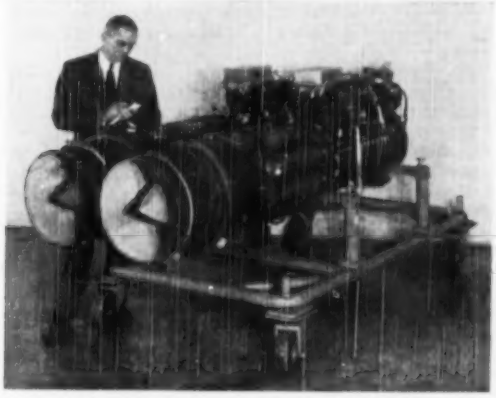
Another French experiment is Hurel DuBois HD-10, designed to test lifting struts, high wingspan/wing depth ratio, and Fowler flaps. It is single seater with 40-h.p. Mathis engine. Span is 40 feet, chord 1 ft. 4 in., gross weight 1060 lbs., top speed 124 m.p.h.



Douglas C-124, evolved from C-74, is first *Globemaster II* transport to be produced. Plane carries 50,000 pounds of payload, has gross weight of 175,000 pounds—twice that of C-54's it will replace in MATS. Clamshell doors provide opening over 11 ft. square.



Proposed production model of XC-99, transport version of B-36, could haul 401 passengers or 100,000-pound payload.



New Allison XT-40 turbo-prop engine will be installed in Convair XPSY flying boat. Twin power sections develop 5,500 h.p.

I Learned About Flying From That! NO. 123

Author flew a Luscombe from Reno to Bakersfield, where he found himself in the soup (as the weatherman had predicted).

When the gas gauge says zero, there's no place to go but down.

By JACK WILKERSON

RENO GLITTERED under the first sunlight in two days. It was a break for me at last. I had been stewing on the ground for 48 hours waiting out the weather—while important business waited for me in Bakersfield, Calif., 350 air miles away. Packing my bag hurriedly, I grabbed my hat and hailed a cab. Fifteen minutes later I was talking to the weather station operator at the Reno airport.

"It's finally clear over Reno," he advised, "but there are strong headwinds down the valley and Bakersfield is socked in tight."

"How tight?" I asked.

He shuffled through reports. "The San Joaquin Valley is fogged in from Fresno south to the mountains. Visibility at Bakersfield is one and a half miles; the ceiling is 1,500 feet."

"Any holes where I might get down under?"

"It's reported 800 feet thick and closing. I don't think you'd find any holes."

I was in the automobile business in Bakersfield, and had a shipment of cars due in that day. I had to be there to issue a receipt for the new autos, and the only way into Bakersfield was by bus or train which would take me west over the mountains to Sacramento and south down the valley. Donner Pass highway was closed. I had to be in Bakersfield within a few hours or it would cost me a lot of money. It almost cost me my life instead.

"You might get in on instruments," the weatherman said.

"I'm flying a Luscombe without blind flight instruments—not even a radio." Thanking him for his help, I went out and walked over to my plane.

The Luscombe carried enough gas for approximately 4 hrs. 30 min. of flight, and cruised at 110. Why couldn't I fly to Bakersfield and look the situation over? Tehachapi, located 25 miles from Bakersfield in the mountains, would be my alternate. The fog never climbed up there. If there were no holes I would land at Tehachapi and phone my wife to pick me up in the car. A cinch! I took off in high spirits and headed south toward Carson City.

Everything went well to my first check point, but there I flew over the ridge and encountered the strong headwinds of which I had been warned. My next check point was Bridgeport, Calif., 90 miles away on the northern edge of Mona Lake. It took me 1 hr. 5 min. to get there, with the airspeed needle pointing well above cruising speed. Still I saw no cause for worry. After turning west the wind would be at my side and I could make up for lost time.

My next check point was Bishop, 80 miles away on the opposite side of the lake. It took me 50 minutes to get there. As I flew over the little community, I made my second mistake of the day.

If I had landed for fuel at (*Continued on page 46*)

CAPITAL IS FIRST MAJOR U.S. AIRLINE TO USE GOODYEAR CROSS-WIND LANDING WHEELS

First Commercial Installation on New Super DC-3's For Capital Fleet

WASHINGTON—Capital Airlines has just announced that their new Super DC-3's will be the first commercial airliners in the United States equipped with the new Goodyear Cross-Wind Landing Wheel. This pioneer step by Capital foreshadows a new phase in commercial aviation.

The Goodyear Cross-Wind Landing Wheel is the only device of its kind approved by the CAA for commercial twin-engined transports. It is a self-contained mechanism built into the hub of the wheel that automatically compensates for the effects of cross winds on landings and take-offs.

Use of this new wheel will permit Capital Super DC-3's to take off and land in cross winds of high velocity.

Many Other Advantages

Wide adoption of this new device will reduce the expenditure for future airports. Its use will reduce the need for multiple runways and costly duplication of instrument-landing systems, lighting and other controls by making possible the construction of single-strip landing fields.

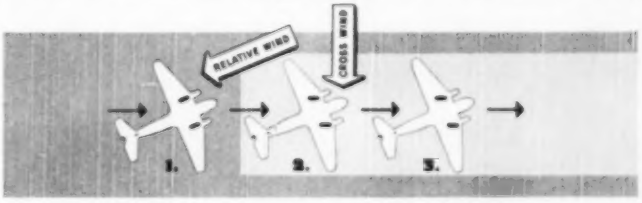
By March, Capital will be operating this new-type Super DC-3 equipped with Goodyear Cross-Wind Landing Wheels.

Can Cut Travel Time

It brings near the day when single-strip airports can be located along waterfronts or close to the heart of many cities. This will encourage greater air travel, by saving passengers millions of hours' ground travel to and from our present-day isolated airports.

The Goodyear Cross-Wind Landing Wheel is now in production for DC-3's and is also available for other aircraft. For complete information write: Aviation Products Division, The Goodyear Tire & Rubber Company, Inc., Akron 16, Ohio or Los Angeles 54, California.

New Gear Permits Landings in High Velocity Cross Winds



1. ***Final Approach***—the pilot establishes proper drift correction angle to line up with the runway. 2. ***Landing***—The instant wheels touch the ground they caster automatically, due to the ship's forward momentum to line up with direction of the runway. 3. ***Landing Roll***—Castered wheels maintain straight-line roll down runway while ship safely weathervanes into relative wind.

GOODYEAR
AVIATION
PRODUCTS

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

FABRIC TESTS

An AOPA member's request for help recently led to a re-interpretation of lightplane fabric weight tests in the CAA's New York region. The New York inspectors required that fabric withstand 46 lbs. pressure when the actual CAA minimum was 36 lbs. AOPA's inquiry on behalf of our member called the matter to the attention of Washington CAA officials who promptly clarified the regulations for the New York region.

PRESSES ROLL

Over half a million impressions were run off the press by AOPA's press crew during the month of November. At the present time, AOPA is printing all its own office supplies, pilot service bulletins, and other publications.

AIR TRAFFIC CONTROL

The Franklin Institute research laboratories are now studying the problems of modern air traffic control. The work is being carried out under a contract awarded by the Air Navigation Development Board of the U. S. Government. AOPA is participating in other ANDB projects.

A simulator capable of representing numbers of aircraft, aircraft separation times, aircraft flight paths, air traffic control procedures, and other data on the use of aircraft runways will be developed.

The simulator is a mechanical or electronic device designed to duplicate in the laboratory the many factors of an operational or systems procedure.

DELIVERY SERVICE

AOPA member Fred Barish (AOPA 40605) recently established an international airplane delivery service. Called Aviation International Delivery Service, "AIDS" delivers airplanes in the U. S. and South America. AOPA members receive a discount on all AIDS services.

HANGAR HINTS

AOPA has been cooperating with CAA in the distribution of CAA's preventive maintenance pamphlets, "Hangar Hints." Each pamphlet (there are six in the series) contains a brief description and cartoon of some phase of aircraft repair. CAA's idea is to help the owner locate defects in his airplane while they are still minor and easy to repair.

Officials of the Personal Aircraft Branch of CAA in Washington will appreciate any comments on these pamphlets from interested pilots.

CITIZENSHIP

Several months ago one of our Canadian members John W. McGruer dropped in to ask for assistance in becoming a U. S. citizen. His papers were in order, but he didn't know a U. S. citizen who could sponsor him. We ran Mr. McGruer's request in the AOPA PILOT and in a short time another member Maj. Ormand K. Flood had offered to sponsor Mr. McGruer's citizenship. Although it was slightly different from AOPA's usual services we were glad to be of help.

WORD HUNT

CAA is currently running a study to locate the 1,000 words most commonly used by CAA ground personnel in giving instructions and information to pilots. The method is to analyze recordings made in CAA towers all over the United States.

CAA's Psychology Branch will then rate these words for intelligibility. The least intelligible words will be dropped and better ones substituted for them.

The project has particular timeliness in light of a request from ICAO that the U. S. recommend a standard English vocabulary for use in world flying.

NON-SKED FLYING DROPS

Private and non-scheduled commercial aircraft in the continental U. S. were flown 15,130,000 hours during 1948, a decline of seven percent from the 16,334,000 hours flown in 1947, according to preliminary findings based on a sample survey conducted by the Aviation Statistics Division of CAA.

The survey was conducted to determine the amount and type of flying performed during 1948 by civil aircraft exclusive of planes operated by the scheduled airlines and the CAA. Final and complete figures will appear in the CAA's annual publication, *Aircraft Use in 1948*.

Several significant changes were noted in the 1948 pattern of flying as compared with previous years. Instructional flying declined sharply and business flying increased substantially.

PROTEST

Thousands of AOPA members wrote headquarters and their congressmen recently to protest CAA's proposed restrictions on personal planes flying Federal Airways. Letters from all over the country helped to quiet official hysteria resulting from the recent tragic mid-air collision which occurred near Washington National Airport.

NEW SERVICE

Insurance available to AOPA members by Lloyds, London, has been replaced by similar coverages underwritten by the American Mercury Insurance Company —"America"—it was announced by J. B. Hartranft, Jr., General Manager of AOPA.

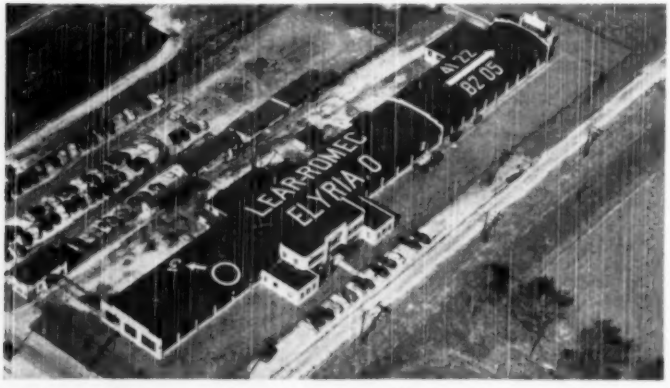
AIR MARKER

Air-minded citizens of Elyria, O., sparked by AOPA member Douglas M. Nichols (AOPA 20009), and other aviation enthusiasts, sponsored a large airmarker for Elyria. The airmarker—visible from over 3,000 feet—was painted on the roof of the Lear-Romec plant (see photo). The project was entirely financed by the Lear-Romec company.

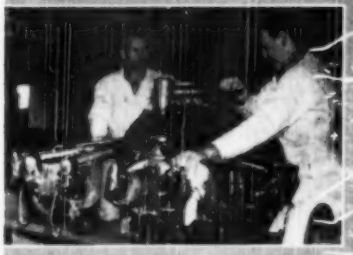
NEW AIRPORT MANAGER

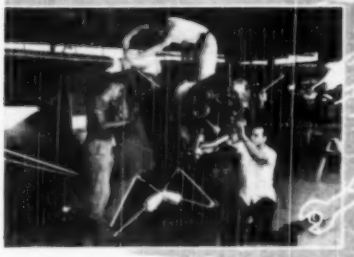
The Chicago-Hammond airport is now under the management of Kurt W. Kunau (AOPA 3333), a charter member. He has had over 25 years of flying all over the world.

The new manager plans to make flying available to more people through the All American Flying Clubs, Flight No. 1 plan.



New airmarker on the roof of the Lear-Romec plant in Elyria, O., is visible from over 3,000 feet. Location of Elyria airport is indicated by the circle and arrow.





WHAT are they DOING?

The young men in these pictures are on the jobs for which they trained; good-paying jobs that require skilled hands. Only a few short years ago they only hoped to hold such positions. Study and training was the solution. You can follow in their footsteps. Thousands of new employees are needed in aviation — men with training to build, fly and service the speedier, more powerful and longer-range aircraft. The only limit to your progress in aviation is lack of training and skill.

Spartan can provide the training that will prepare you for a successful career in aviation. Spartan has the shops, the aircraft and equipment, and industry-trained instructors. Your progress is entirely dependent upon your ability to absorb instruction. You train on "live" aircraft. You study exploded assemblies, cut-away models, training films and diagrams that enable you to gain most knowledge in the least possible time. *You'll not need MORE than SPARTAN training, you cannot afford to take LESS!*

Airlines, manufacturers and airport operators call on Spartan for graduates from this internationally-famous school. The demand is greater than the supply. Get your training NOW — **there will be a job for you!**

The New Spartan Multi-Engine Maintenance Mechanic and Flight Engineer Course fills a serious need by supplying men of increased training and knowledge of the operation of large, complex aircraft. Write for Special Folder.

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Spartan School of Aeronautics Dept. F-20
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- ☐ Flight
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- ☐ Meteorology
- ☐ Management and Operations

Spartan is approved for training under the G. I. Bill of Rights

THE MAIL BOX

BIPLANE REPLICA

Back in 1914 I saw my boyhood hero, Lincoln Beachey (still "the greatest of them all"), fly his midget biplane in a race against Barney Oldfield in his racing car. It was a thrill I've never forgotten.

After that amazing exhibition, 36 years ago, I decided that someday I would build an exact duplicate of Beachey's plane. Finally, after years of research and two years spent in construction, the replica has been completed, exact in every detail.

Original (Beachey in straw hat, right.)

Replica built 36 years later.

The wheels, tires and propeller are the only parts I did not build myself.

The plane, powered by the same type engine that Beachey used (an 80-h.p. Gnome rotary), has a top speed of 80 m.p.h., a stalling speed of 50 m.p.h., and will climb 1,125 feet per minute.

Oldtimers may be interested in the specifications: wing span, 21 feet; length, 18 feet; height, seven feet, six inches; gross weight, 890 pounds; empty weight, 670 pounds; wing loading, six pounds; fuel capacity, six gallons.

The plane has been certificated by the CAA and I plan to fly it in air shows.

The day it took off on its first flight, I was more than repaid for the years spent in research and work.

ALBERT J. DUDECK, Chief Mechanic
Sky-Tech, Inc.
Cleveland, O.

● Col. Warren Eaton who built the original biplane for Beachey recalls some of Beachey's hair-raising stunts: "During his 1914 exhibition tour, Beachey performed every trick or maneuver that was then or now possible with an airplane. These included, to list a few, inside and outside loops, half inside and half outside loops by snaprolling at the top and bottom of the loop, climbing continuous loops, tail-first drops, upside down flights with and without power, and 8,000-foot vertical dives with power off. His exhibitions around half-mile tracks with Barney Oldfield could never be duplicated. He would round the turn behind Oldfield, bring the plane to within a few feet of the ground, then up and over Oldfield, either patting him on the head with the wingtip or one of the wheels. Anyone who saw him perform could never forget it."—ED.

POVERTY IS NIL

Capt. Sam Turner, author of "Combat Christmas, 1943," [December, 1949, FLYING] is very wrong when he says that most Swiss are poor. The Swiss, in fact, are the richest people in Europe, per capita, and poverty there is nil.

C. A. QUEIROLO
San Francisco, Calif.

RIGHTO!

Betty Skelton [December, 1949, FLYING] mentions that the Gatwick (London) tower told her to taxi out the "perry track." When I flew with the RCAF in England in 1944 and 1945, the term in use was "perimeter track." As the name implies, this was a series of taxi strips running around the perimeter of the airport and connecting the ends of the various runways . . .

T. M. SMITH
Dallas, Tex.

HOT PILOT

Last summer a number of pilots at the Elmendorf AFB in Alaska were skeptical of Lieut. James E. (Buzz) Jarvis' gunnery score. It seems that Buzz, a member of the 64th Fighter Squadron, had scored 90 per cent hits on routine gunnery missions in his F-80C.

Lieut. James E. (Buzz) Jarvis.

In October he flew another routine mission, during which he made six passes at the sleeve target while traveling over 500 m.p.h. During those passes he fired 196 rounds of .50 caliber ammunition. His official score: 193 hits out of the 196 rounds fired.

The boys at Elmendorf aren't skeptical any more.

LACHLAN MACDONALD
Anchorage, Alaska.

BEAUTIFUL LITTLE PLANE

You may be interested to know that the clipped-wing Piper P-2 aerobatic plane shown on page 41 of the December issue was built by the Piper Aircraft Company in 1941 and is not a home-grown or cut-down Cub. It was the only plane of its type built by Piper.

This plane is hangared here at the Riverside Airport and is flown by Gene Griffin, 1948-'49 winner of the "Bill Sweet —Polishing Pylons" trophy for precision lightplane aerobatics.

I perform all the maintenance work on this beautiful little plane and, to my way of thinking, it is one of the best in the country.

C. DONAVAN BARBER
Zane Flying Service
Riverside Airport
Zanesville, O.

ARGENTINE "FLYING WING"

In "The World of Wings" [August, 1949, FLYING] the author states that three nations have been carrying out research and work in the development of "flying wings."

Argentina recently has started experiments in this field. To give you an idea of what we have accomplished, I am enclosing a photograph of an unusual "flying wing"—a two-place glider.

ALFREDO OSCAR LLORENS
1st Lieutenant-Colonel
Ministry of Aeronautics
Buenos Aires, Argentina.

PRO AND CON ON "THE BITE"

I would like to take exception to Col. J. C. L. Adams' article "The 'Bite' in Central America" [November, 1949, FLYING].

Without previous flying experience I recently took delivery of a new Cessna 140 and after five weeks of flying instruction, soloed from Holdenville, Okla., to my home in Guatemala. I met with nothing but kindness and consideration from everyone during the entire 2,000-mile trip. . . . No diplomat could have enjoyed more instances of real courtesy and hospitality than I did.

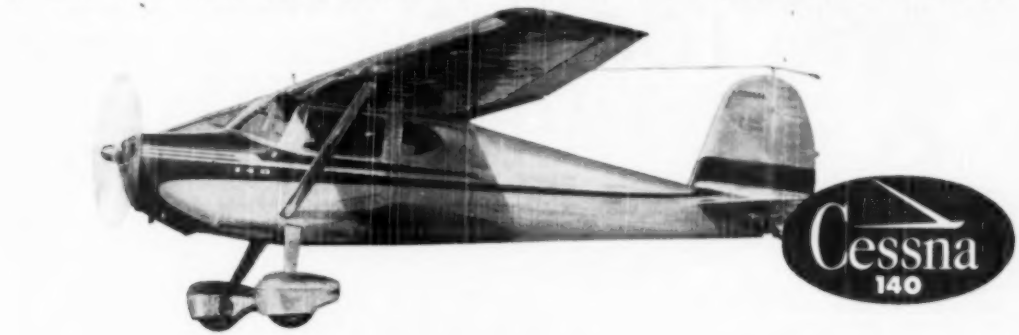
E. H. CARRETTE, GENERAL MANAGER
Pan American Hotel
Guatemala City, Guatemala

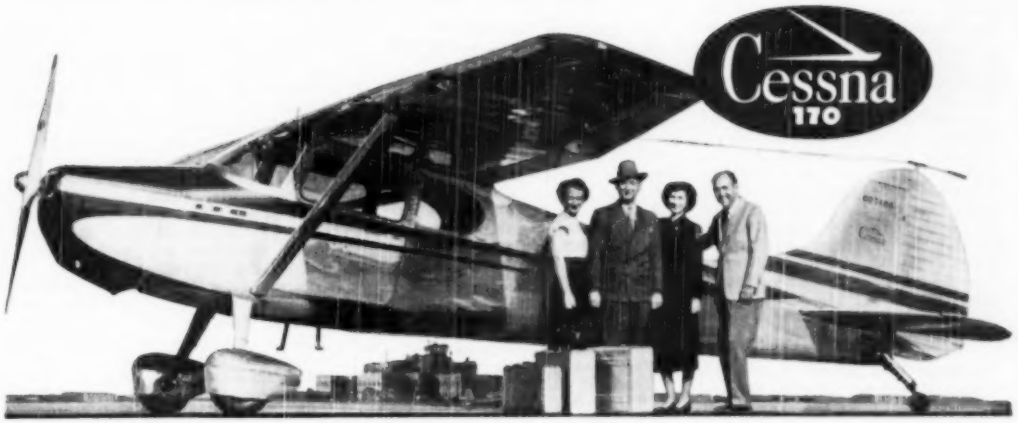
To many of your readers, Colonel Adams' report on Central American travel may not seem credible. Unfortunately it is.

Our non-scheduled C-46 had clearance to land at Albrook Field in Panama on return from our first cargo trip to South America, but we had the misfortune to land after dark. The plane,

(Continued on page 63)

★ SEE THE NEW 1950 CESSNAS—NOW AT YOUR CESSNA DEALER'S ★





Cessna "All-Metal Engineering"

BRINGS YOU TODAY'S GREATEST 2-PLACE AND 4-PLACE VALUES!

CESSNA 140: A roomy, 2-place, *all-metal*, cross-country plane . . . now even more beautiful and more comfortable. New, comfort-engineered seats—even better visibility—less cabin noise.

Compare this new Cessna 140 with *any other* 2-place plane . . . *on any basis.* For example, efficiency formulas all over the country show it delivers more miles per gallon—more speed—more range. Try it yourself on a tough traveling schedule. You'll discover that on an average 1000-mile trip in the U. S. your Cessna 140 will be within an hour of the DC3 airline schedule. And you'll be able to go *where* you want *when* you want . . . to arrange your schedule to suit yourself.

Can your business afford not to buy the money-saving transportation—the extra convenience and comfort—the extra mobility this new Cessna 140 offers? ARRANGE TODAY FOR A PRACTICAL TEST. Your nearest Cessna dealer will be glad to help you.

CESSNA 170: The famous "Family Car of the Air" . . . With new streamlining, new convenience, new comfort! Luxurious interiors with plenty of room for *four* large men and their luggage.

Analyze what this airplane will do for you and your business: Over 120 m.p.h. cruising speed! Over 500 miles comfortable range on a filling of gasoline. (You'll get over 15 miles per gallon—and you can go that mileage-saving direct route.) You and your men can go *where* you want—*when* you want—FAST! And you can take associates and customers with you. What would this be worth to your company in a month, or a year? Why not arrange for a practical test with your Cessna Dealer? This new Cessna 170 costs literally thousands of dollars less than any other 4-place, all-metal plane on the market!

THERE'S A CESSNA THAT FITS YOU AND YOUR POCKETBOOK!
Arrange Today for a Practical Test

ALSO SEE the Cessna 190 and 195 . . . 4 to 5-place personal airliners with every safety and comfort feature—yet surprisingly economical to own and operate. *All-metal* . . . airline-type engines . . . the most luxurious personal plane built today. Larger, more luxurious cabin—more capacity, more speed, more range! See and try a 190 series Cessna yourself.

See Your Nearest Cessna Dealer or USE THIS COUPON

Cessna Aircraft Co., Dept. F-1, Wichita, Kansas

Please send free literature giving complete description of the Cessna 140 [ ]; Cessna 170 [ ]; Cessna 190, 195 [ ]. Literature for model builders [ ].

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Street .....

City ..... County .....

State ..... Phone No. .....

LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

THE DURABLE RICK

Not so long ago at a banquet the famous and exceedingly durable Eddie Rickenbacker was asked how it was that Eastern Air Lines went on consistently making money while all the other big ones were just as consistently losing it. The report is that Eddie got up and made one of the finest speeches on record, being one of the shortest. He said, "We have only one vice president and we work hell out of him."

There is a story going around that an Eastern Air Lines co-pilot had a dream that Rick was dead, which shows that it was a dream because you can't kill the guy. In the dream the pall bearers were carrying the casket down the aisle of the church when Rick sat up and gasped in icy tones, "If you put wheels under this thing, you could fire four of the crew."

* * *

AH, THE EARLY DAYS

Aviation goes around in the best cycles. We are getting back more and more to the early days of flying, so far as the design elements of our aircraft are concerned.

A plane with a tail going first is under design—it is called a canard, not the dirty kind—and the Wright Model A had that. Tricycle gears are common, and the early Curtiss had that. The Wright had contra-rotating propellers. And we have gotten back to thin wings again.

The first Wrights took off by catapult and landed on skids. And what do you know, that is the latest thing. British carrier pilots are making experiments landing their jet fighters, fitted with skids, on a carrier deck that is covered with rubber.

Personally, I have never made a belly landing with a carrier airplane, but I think that I would feel at home.

* * *

Clothes that make the girls look good make the men do likewise.

* * *

SHAKESPEARE ON AVIATION

Pilot to Airways Traffic Control:

Is there no respect of place, persons, nor time in you?

—Twelfth Night. Act II, scene 2.

* * *

ANYWAY, YOU GET IT IN THE END

The pendulum swings, and the child training experts are slowly returning to the satisfying, to the parents at least, theory of our grandfathers that to spare the rod is to spoil the child. The idea is to make them smart at one end to make them smart at the other.

* * *

BEWARE OF CRACKING UP

You don't have to be a pilot to crack up.

You people who find yourselves thinking of taxes, the CAA, and the other signs of American progress, will be glad to know that you need not worry if you talk to yourself, and I have this on good authority. It does not mean you are crazy.

A leading flight surgeon who specializes in psychiatry as a hobby said, "If you should notice now and then that you are talking to yourself, don't let that fact bother you in the slightest. But look out if you start interrupting."

* * *

HOW I BECAME TWO-FACED

What a lot of people don't know is that we had plastic surgeons as early as 1917. After a crash in the First World War your modest reporter had his face put back together again. The trouble was that the young plastic surgeon used too darn much originality.

* * *

FOR THE RECORD

The editorial staff of the *Saturday Evening Post* is wont to boast of what they call *Post* luck because at rare intervals they would come out with a story and right afterward something would happen to the subject that would get national attention. Now your reporter does not have a crystal ball but he has done pretty well with key-holes and such, and the record is mighty good. Here is a recent list:

Atom story. Newspaper break appeared in a few days . . .

Collision and traffic story. Ditto . . .

Fire story. Ditto . . .

You ought to brag about that a little, seeing as how I am too modest to mention it.

* * *

PASSING PARADE

Sadie the Stewardess says that all men make passes, and so a girl never knows whether or not she is just a passing fancy.

* * *

MONTHLY EPITAPH

He wasn't a bit conservative
So now he's filled with preservative.

I Learned About . . .

(Continued from page 40)

Bishop. I could have telephoned to Bakersfield and discovered the ceiling there was then 150 feet—the visibility, 750! But according to my calculations there was plenty of fuel in the tank to take me over Bakersfield and on to Tehachapi if necessary. I continued 55 miles to Lone Pine, passed to the left of Mt. Whitney and climbed to 10,000 feet. I had been in the air 2 hr. 45 min.

I flew out over Owens Lake, turned southwest toward the mountains, dodged between two peaks—and found myself buffeted by a strong headwind blowing in from the ocean. Still I would not turn back. Only 90 miles to go—115 to Tehachapi at the most. I had enough gas for an hour and a half. My third mistake.

The minute hand on my watch traveled at such speed that again and again in the next 70 minutes, I thought it would surely overtake the second hand. I watched the airspeed indicator, my chart and the terrain at the same time.

The airspeed needle climbed above the red line and stayed there—the throttle was wide open. The chart was of no use because I was unable to identify any check points. And watching the terrain was easy—it was standing still. Each time I turned to look at the gasoline gauge a chill went down my spine.

I studied the terrain below me, studded with rocks and scraggly timber, and realized there was not a single spot I could set the plane down safely if the necessity arose. It was then I began to repent my sins, and my pressing business didn't seem nearly so important. I was still cursing myself and my luck when I finally broke out into the valley.

I headed out over the billowy white sea under which I knew Bakersfield lay, and started looking for holes. I had gasoline for 20 minutes of flight. Time to take a quick look before hightailing it to Tehachapi.

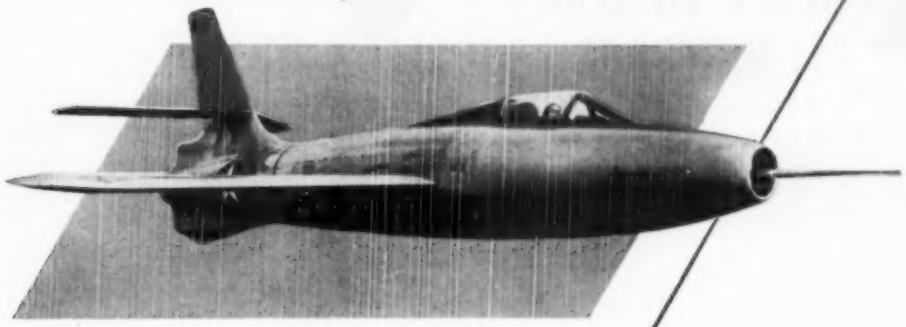
A white sea with towering white waves —a white desert with mushrooming white trees. I found a black spot and knew that would be smoke from the city. I circled looking for holes and found several—arrived over them to discover they were only chasms extending down 100 or so feet to disappear into more chalk-white fog.

The next time I looked at my gasoline gauge it was too late. It read "zero" and for the first time in my life I was scared stiff. I glanced in the direction of the pass leading to Tehachapi. Too far. I felt awfully small and helpless sitting up there alone. I had no parachute. No place to go but down.

The Kern River comes into Bakersfield from the east. There are bluffs along its south bank. I had to get north of the river, attempt to dive under the fog and come back on top of the bluffs to land at La Cresta airfield located there. It didn't look easy. It wasn't.

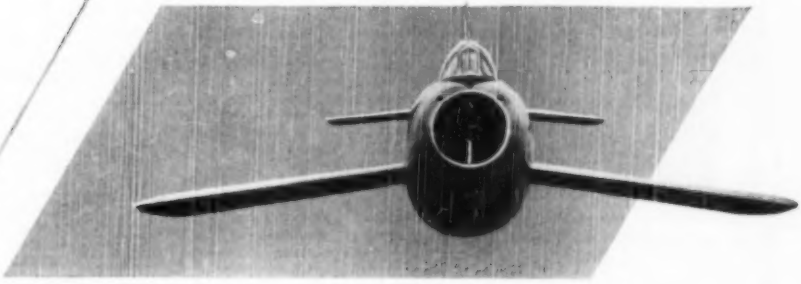
I checked my altimeter against Bakersfield elevation. My altitude was 1,600 feet. I decided to find a hole, dive, and

THIS IS THE XF-91



Made by the makers of the mighty Thunderbolt . . . which set enviable records in the hands of Air Force pilots during World War Two . . . and later, builders of the F-84E Thunderjet now being manufactured in quantity for the Air Force . . . Republic is justifiably proud of the XF-91 presently undergoing flight tests at the Muroc Air Force Base in California. ¶ *Conceived and produced to perform as a high speed . . . high altitude interceptor . . . with both turbo jet and rocket power . . . the final acceptance specifications of this great ship will, we are confident, prove to be one more vital weapon in Democracy's arsenal.*

. . . Republic Aviation Corporation, Farmingdale, Long Island, New York



REPUBLIC AVIATION

Makers of the Mighty Thunderbolt • Thunderjet • XR-12 • XF-91

BETTY SKELTON'S NOTEBOOK

COMMAND PERFORMANCE

Was pleasantly surprised when *Little Stinker* was invited to fly her first command performance. Upon request from Vice Adm. JOHN W. REEVES, Chief of Naval Air Training, we flew an exhibition at Pensacola's beautiful Naval Air Station. I felt worse than I did on my first ride with the CAA inspector, knowing that the admiral, his staff, and most of the graduating cadets were on the field watching. As we passed the stands on take-off *Stinker* surprised all the brass with a long, low whistle (the "wolf call" is connected to the intake manifold hidden underneath the nose cowling). Nicest surprise of all came when I climbed into my plane and found a pair of gold Navy wings occupying the usual bare spot on the left side of the instrument panel.

Several weeks ago Florida State Aviation Supervisor WALLY SCHANZ took State Comptroller CLARENCE GAY up for his first ride in the cockpit of a plane. After the flight, Wally started his long straight-in approach to Leesburg Airport in the Twin Beech. Still five miles out, he closed the throttle a little too much, and the gear warning horn let out a long "BEEEEEEEP." Gay peered out the window, was silent a few seconds, and then exclaimed, "Now DON'T tell me they can hear that horn way down there at the airport!"

MIDGET MODEL

Just received a letter from PETER DONAVOUR-HICKIE in Surrey, England, telling me he has completed a 14-ounce model of *Little Stinker* since my visit there several months ago. The model which took 600 hours to build, is about twice the size of a package of cigarettes, has movable controls and, most amazing of all, a maximum speed of over 70 m.p.h.!

IT PAYS TO ADVERTISE

Eastern Air Lines recently spent more than $2,000,000 advertising Florida as a wonderful vacationland and encouraging people to *fly* there. Now PRESCOTT TOLMAN, Eastern's General Sales Manager, is wondering if it was worth it. While on a recent business trip, Tolman was grounded in Washington so he took a train south. On the train he sat beside a nice elderly lady who opened her handbag and showed him one of Eastern's huge newspaper advertisements which she had neatly folded away. She explained, "I kept reading these ads telling how nice Florida is, even giving the temperature and the best places to go, and it completely sold me." She paused a moment and then added brightly, "After I had made up my mind, I didn't lose a minute in getting my reservation on this train."

Each year Tampa and St. Petersburg, Fla., stage a big celebration to commemorate the world's first commercial airline flight (flown between these two cities by Tony Jannus in 1914). This year private pilots from all over the southeast participated in a gigantic mass flight. One of the most outstanding planes in the flight was a specially-built midget biplane, *Baby Sunshine*, flown by Mary Wolf of the U.S. Flying Service in St. Petersburg.

Had my first ride in a helicopter, thanks to KYLE VICK of American Industrial Sales Corp., in Sebring, Fla. It was quite an experience just sitting there at 1,000 feet and not stalling out. Before landing, I was given a hair-raising spray demonstration and even though I hope to obtain a helicopter rating soon, I'm positive I won't be applying for any jobs as a helicopter spray pilot!

Betty Skelton

count to 10. If I didn't break through I'd pull back out on top and decide on something else.

Down I went with the carburetor heat on and the engine idling, counting slowly, one . . . two . . . three . . . four. . . . The white void engulfed me. My cockpit was the loneliest place in the world. Sweat broke out on my face. The altimeter was lagging—the compass spinning crazily. Fog condensed on the windshield and the cabin became strangely chilled. At the count of seven I lost my nerve—shoved the throttle against the panel, turned off the carburetor heat and jerked the stick back against the seat. My weight was against my back. I was going up. Too fast.

As the sun began to penetrate the fog the airspeed indicator dropped heavily and the ship shuddered as it started into a stall. I slammed the stick forward and heard the engine begin to rev up. A few seconds later I broke out on top and breathed for the first time since starting my count.

At that moment I wouldn't have bet five cents I would live to tell this story—I would have given everything I owned for a parachute.

No alternative but to dive again, and this time I would go through regardless of the outcome. The zero on the gasoline gauge stared out accusingly at me.

One . . . two . . . three. The fog had closed in. Four . . . five . . . six. *Better to fly into the ground than die of suspense.* Seven . . . eight . . . nine. *You lose your equilibrium in the soup. Am I right side up?* Ten . . . 11 . . . 12. . . . *Is that motor idling or am I climbing? Too much weight on the right side—right wing is dropping. Can't stand this any longer . . . got to pull out!*

Back . . . back on the stick. The stuff turned from white to grey—to brown. The earth. No time to celebrate. An oil well derrick jutted above my right wing, another off to the left and a pumper's house directly in front. A woman feeding chickens in her yard dropped a bucket and ran as I skimmed over the roof.

I had broken through a half mile above the bluffs—less than a mile from the airport. My own home was between me and the river. I passed over it at 40 feet, turned to follow the river to La Cresta, and jumped the plane up over the bluffs to land.

I was back in the fog again. The airport office building passed under my right wing. Hazy faces were looking up. I made a sharp turn to line the Luscombe with the runway and wheel landed at 85 m.p.h. I taxied to the gas pumps, cut the switches and slumped back in the seat—exhausted. I couldn't believe I was still alive.

A few moments later I was at the airport lunch counter trying to hold onto a cup of coffee. One of the attendants came in and told me my wife had just phoned that she would pick me up. I asked him how she had known it was I who flew over.

"She said nobody but her husband would be so stupid." He didn't laugh. I didn't either. END

BETTER SERVICE MEANS "HAPPIER LANDINGS" AT THIS IMPORTANT AIRPORT!

CONVENIENCE... COMFORT... SERVICE! You want the best of all these things wherever you land. And at the efficiently operated Baltimore Municipal Airport, the Atlantic Aircraft Distributors, Inc. makes it its business to provide excellent hangar and tie-down facilities... aircraft and engine repairs by skilled, licensed mechanics... fast, dependable maintenance with good aviation products.

ALWAYS AVAILABLE at Baltimore Municipal Airport are high-quality Esso Aviation Products. Proved by more than 40 years of actual flying... backed by continuing research in America's largest and most modern aviation petroleum laboratories... Esso Aviation Products are known for dependable performance!

PHIL ANDERSON, owner of Atlantic Aircraft Distributors, Inc. which sells Esso Aviation Products exclusively at Baltimore Municipal Airport.

WHENEVER YOU LAND at Baltimore Municipal, you'll find efficient traffic handling 24 hours a day by the CAA operated tower and weather station... a good restaurant right in the Terminal Building... and convenient bus and limousine service.

Engines Are Too Good

(*Continued from page* 32)

Maybe it is just what it feels like—a patch of rough varnish that can be repaired with a piece of sandpaper and a new coat. But maybe—and here is where logic pays dividends—the roughness has been caused by moisture entering the wood through a separated propeller blade lamination and blistering the varnish from beneath. If so, take-off would be about as sensible as riding a torpedo to its target.

This is a simple example of combining cause and effect to reach a safe conclusion.

Cowling must be removed during preflight inspection of the engine. Most instructions will tell you to wipe the cowling clean, then examine it for cracks. This is good advice. But in this case the instructions are getting a bit ahead of the careful inspector. He'll examine the dirty cowling first, looking for undue accumulations of oil or grease that indicate an engine leak, or for exhaust gas stain tracks that indicate a leaky manifold gasket or burnt stack.

All parts of the engine and firewall should be wiped clean during inspection, but not before locating and trying to determine the cause of the dirt accumulation. The swipe of a rag will wipe away oil droplets that indicate a leaky gasket, and it may take several minutes for enough more oil to seep through to be visible. It is hard to see evidence of gasoline leakage on a fuel line that's been wiped bright clean, while damp dust or saturated grease amplifies the visibility. Clean all parts thoroughly, but not until you've used the dirt to your own advantage. Remember meanwhile that dirt can conceal a lot of defects unless it is wiped away.

The inspection form details inspection of the fuel system, but here again keen logic can forestall trouble—trouble that's not even mentioned on the form. It is common practice to drain and clean the gascolator, but in doing so, what are you draining and cleaning away? Is there an unusually large accumulation of water? Of sediment? If so, why? Have you permitted the airplane to stand idle for several days with a near empty fuel tank, thus permitting excessive atmospheric condensation in the air space above the fuel? If so, there's probably a lot more water in the fuel system than shows up in the gascolator bowl. Maybe enough to cause trouble when the fuel supply starts running low. It's safer to be sure.

You're told to inspect the ground leads and high tension cables, and make sure that all connections are secure. Do it, but go farther than that. Flex the high tension cables through your fingers and look for insulation cracks. Cracks leak off a lot of voltage—enough, sometimes, to make the engine misfire and run hot. Examine the cables and wires where they go through grommets in the firewall or in cable supports. There's a lot of abrasion at such points, and the insulation may be wearing through. While you are examining and cleaning the spark plug porcelains, look for burned cylinder enamel around the plugs and on adjacent cooling fins. Maybe the engine has been running hot.

Welds in the engine mount are often hard to get at and even harder to wipe clean due to the roughness of their surface, but the most insidious and dangerous cause of structural powerplant failure may lie just below that film of dust or grease. A cracked weld in an engine mount can transform a quiet and routine flight into a cataclysm of disaster and wreck both engine and airplane in a fraction of a minute.

Lightplane engine operation is usually limited by specified operating ranges of crankshaft speed, oil temperature and pressure, and the fuel-air mixture ratio. In smaller, less costly airplanes, only three engine instruments are available—a tachometer, and oil temperature and pressure gauges. Engine operation itself will have to serve as an index for adjusting the fuel-air mixture ratio.

Nothing will deteriorate an engine faster than operating it beyond or below its specified operating ranges. Two factors converge here to cause the trouble—the improperly operated engine will usually run hot, thus reducing the strength of its structural components, and high strains will be placed upon the weakened members by improper operation.

In the case of lightplane engines, excessive crankshaft speed is particularly dangerous. This puts a terrific strain on the bearings and crankcase and other engine structural members. At the same time, the engine will overheat. Failure may not result immediately, but repeating the performance adds to the danger. Furthermore, and though actual failure never occurs, these strains distort the structural members enough to throw them out of accurate alignment and cause excessive wear.

Oil temperature and pressure ranges are equally critical. Oil is literally the life-blood of an engine, and unless it is delivered to all moving parts at the right temperature and in the right amount, excessive wear will result. Hot, thin oil will not lubricate properly, and cold, thick oil will not flow freely, and a certain amount of pressure is required to force the oil between close-fitting moving surfaces. The pilot who desires to prevent engine failure, or at best excessive wear, will keep a close tab on the temperature and pressure ranges, and will seek expert advice whenever either gets out of line.

Correct air-fuel mixture is necessary for smooth operation of the engine. Unfortunately, this is not a fixed ratio and is affected by ambient temperature, altitude, humidity, throttle position, and engine cylinder temperature. The larger the engine, the more delicate this mixture gets to be, and on supercharged engines it is of paramount importance.

The best check on mixture ratio is operation of the engine itself. The highest tachometer reading at a given throttle setting will be obtained when the mixture is right. A mixture that is too rich results in loss of power, reduced engine r.p.m.'s, a reddish exhaust flame, and a drop in oil temperature due to the tendency of the engine to run "cold." A mixture that is too lean results in power and r.p.m. losses, a bluish exhaust flame, and a rise in oil temperature.

Manipulation of the throttle should be gradual. Never open or close the throttle quickly. This causes a complete reversal of all operating stresses and throws heavy strains on the structural members and bearings. Jamming the throttle open may produce enough strain on the con-

15 YEARS AGO

FROM the February, 1935, issue of this magazine:

A high-wing monoplane, powered by a converted motorcycle engine, was designed and built by two Texas teen-age boys. Total cost: $80.

Six Russian aircraft factories employed approximately 17,150 workmen for the construction of military planes.

TWA announced that its 86 pilots would aid meteorological research by taking photographs of clouds and other atmospheric conditions observed during flight.

Amelia Earhart completed a solo flight from Honolulu to Oakland, Calif., in 18 hr. 16 min.—the first pilot of either sex to make that trip alone.

Wallace Beery's new Bellanca *Skyrocket* (below), powered with a 550-h.p. *Wasp* engine, was "the last word in airplane construction."

Milton Reynolds logged 800 hours and flew 99,782 miles in his Stinson *Reliant* during the first nine months of 1935; "possibly the greatest single-year mileage flown by any private plane in the United States."

An article on U. S. pursuit planes stated that "despite the present trend toward the two-seater, the single-seater remains the backbone of the fighting units of both services."

William Briegleb, employed by the production department of MGM studios, was "looking for some young, active fellows to help him finish a sailplane for which he had all the parts already purchased." [Briegleb is now president of the Briegleb Aircraft Co. in California.]

TWENTY YEARS AGO

A Soviet aviation society called "Friends of the Air Fleet" was reported to have enrolled more than 2,000,000 members in 32,000 organization units. The society's goal: "5,000 aviation centers and the world's largest air fleet."

necting rod and crankshaft bearings to completely exude the lubricating oil film, thus resulting in metal-to-metal contact and sudden failure of the involved parts.

Most complete operational engine failures result after a period of prolonged sub-par operation. Very few operational failures occur instantaneously. The trouble is cumulative in nature, reaching a point at last where the engine cannot continue to run. Thus dirty spark plugs or a partially clogged fuel line will cause mild erratic engine operation at first, but the trouble will grow more severe as the plugs become dirtier or more sediment gathers in the fuel line.

Fortunately, nearly all engine troubles result in trouble symptoms which can be recognized by the watchful pilot. It is thus possible to detect trouble before it assumes serious proportions. The big gremlin in this situation is that too many pilots fail to notice trouble symptoms, cannot interpret them, or underestimate their importance. This factor alone is without doubt responsible for more accidents caused by engine failure than all other factors combined.

Many trouble symptoms are simple and indicate offhand what is wrong. Others are highly complex and require analysis by a licensed mechanic. Erratic engine operation, for instance, may be traced to dirty spark plugs, but this may not be the true seat of the trouble. New plugs, when installed, will foul quickly. This means that the real seat of the trouble is elsewhere. It may be in the ignition system, the fuel system, or any one of several factors which will cause the engine to overheat or run cold. From the pilot's standpoint, the most important consideration is that a trouble symptom exists and his most important act is to have it corrected immediately. END

Canada's Plan

(Continued from page 34)

have been designed for applicants of the subsidized training scheme in which all grants under the scheme are reviewed. The application forms plainly point out that the subsidized training plan is for men and women who have not had previous flying training except under a special RCAF scholarship course.

Flying clubs and training schools which come under the subsidized training plan have to follow an approved training course set out by the Department of Transport. This is outlined in a new Civil Flying Instructor's Handbook, and includes a minimum of 30 hours flight training, with at least 12 hours dual instruction. The school or club must have sufficient training aircraft, as well as instructors and facilities to give continuous training to students under the plan. Safety is stressed in all teaching, and monthly reports on student progress are required. Clubs operating schools must belong to the Royal Canadian Flying Clubs Association, and schools must be members of the Canadian Air Industries and Transport Association. END

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Adventure

(Continued from page 25)

jobs. These he slipped into his pocket. On the lid of the baggage compartment he laid with reverent care a new, shining Stetson cowboy hat. He had just bought it the day before in Cheyenne.

"Joe," he said, calmly and pleasantly, "looks like we're going to have a little lesson in forced landings. Now, remember what we learned in our first two lessons? Straight-and-level flight and shallow banks, left and right?"

Joe nodded, his body tense. Red continued, "I want to trade places with you so that I can be in the front seat."

Removing his seat belt, Red pressed the door open against the 90 m.p.h. slipstream. He wedged himself between the door and door jamb. Steadying the stick he helped Joe up and over the front seat and told him how to slide backwards into the rear seat. As soon as Joe had fastened his seat belt, Red eased forward with his long left leg, first over the front seat cushions, then slid into position in the front seat, letting the door close again.

Talking to Joe as though they were in a classroom, he had Joe practice his straight-and-level, his shallow banks, and co-ordination of stick and rudder. While Joe worked at his lessons, Red was busy with a screwdriver prying on the two left sliding windows. One by one they popped out and disappeared.

With the windows gone he turned his attention to the pine plywood floor boards. Patiently hacking and whittling with his knife, screwdriver, and hammer, and kicking with his boot, he opened up a hole in the plywood. Then several cuts with the knife through the belly fabric exposed the end of the axle strut at its hinge.

Bent double, almost on knees and elbows, he reached through these holes and, slowly inching his fingers down the axle strut, worked the whole hanging assembly upwards. As soon as he had reached the place where the brake cable emerges from its housing, he pulled the cable (which had broken at the brake junction) up through the hole. Using this around the front seat leg, he pulled the assembly back to the open end of the landing gear frame.

All this time Joe was flying the trainer back and forth at 2500 feet. He wondered what this crazy red-head was doing but he asked no questions. Joe told us afterwards that Red had next called out to him, "Joe I'm going out that window and pull the landing gear into place. This airplane will lean to the left, so you will have to give it right stick to hold the wing up."

Without hesitation, Red worked his 190 pounds through the small window opening and out into the 90 m.p.h. slip-stream. Slowly, ever so carefully, Red eased himself onto the left lift struts. Clutching the window sill with his right hand, from a sitting position, he leaned forward to offset the propeller blast.

Sliding his belt from his pants, he leaned far down below the lift strut, caught the outer end of the oleo strut assembly, and engaged it in the case frame socket. Then, with the belt looped around the outer end of the axle strut, he pulled the entire assembly into place. Then squatting on the lift struts, he anchored the other end of the belt to the lift strut junction with the screwdriver. The assembly was in position for a normal landing now if it would stay that way. Red cautiously climbed back into the cabin.

"Joe, I guess we've disappointed all those people down there," he yelled.

A large crowd had gathered and more coming in by the minute. Cars were lined solidly along the highway. Tragedy is its own press agent.

Joe was semi-rigid with fear by this time. Rivulets of perspiration had soaked his clothing. He told us later, "I wasn't worried about getting down without an instructor. But I was sure worried about that crazy red-head. I thought sure he was a goner a couple of times."

But their troubles were not over. As Red took over control from Joe's willing hands and maneuvered through a few testing turns, the left landing gear slipped out and down again. By this time the sun had set. A quick calculation of gas supply gave but a few minutes. Something had to be done within the next 15 minutes.

Red gave Joe the stick again and climbed out the window. Patiently he again fished up the oleo assembly while hanging onto the lift struts. This time he laid the oleo parallel to and on the outside of its frame. Once again he anchored the belt to the lift struts with his screwdriver and climbed wearily back into the front seat.

It was now or never. He cut the gas valve to consume all the gasoline in the lines and carburetor before landing. When the propeller ceased turning he cut the switch and started a long glide.

On the ground we knew that this was it. Sirens warned people away from the runways. Each guard and fireman was at his place. With fire extinguishers at the ready position, we waited for the crash. None of us knew what Red had done.

The stilled Aeronca slipped through the quiet air. Calmly Red turned into traffic pattern and approached the runway. As he glided over its end he turned due West. Silently, the plane moved over the line of cars and levelled off. About halfway down the field she dropped into a three-point landing not far from the fire truck. As she rolled for some 30 feet, the wheel assembly, under friction with the turf, slowly moved back, letting the left wing down. Old NC82506 described a slow ground loop, stopping about a quarter of the way around.

Flash bulbs popped, sirens screamed, people ran from all directions, dozens of automobile lights converged on the aircraft. Fire truck, ambulance, squad car, coroner's car, airport jeep and all the rest, left their position and clashed gears racing to the Aeronca. Red opened the door and stepped out. With a courtly gesture and sweep of the arm, he helped his student to alight. I pumped Red's hand in congratulation for his daring act and asked him how he felt.

"Awful," he exclaimed. "I got my new cowboy hat dirty."

"But why in the hell didn't you land in the runway we laid out for you?" I demanded.

"Well, I just didn't know where that plane would go after she hit, and shorely didn't want to hit any of those perty cars."

What is an operator going to do with an instructor like that?

Joe was leaning against the fuselage, white and exhausted. After shaking his hand, I asked him how he felt.

"Fine, Ed. Nothing in flying will ever bother me again," he replied.

When the excitement had died down, we examined the aircraft carefully. Outside of the purposeful damage Red had inflicted, the airplane had not one injury. Not even the wing-tip was scratched. Red turned to me and, apologetically fingering his dirty new Stetson asked, "Ed, did I do the right thing? Should an instructor take chances like that with a new student? Would it have been better to have taken a crash landing?" We standing around the airplane had no answer. END

"George, for heaven's sake stop mumbling. 'Well I'll be damned!' "

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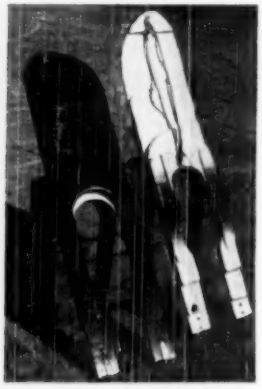
I Land Anywhere

(*Continued from page 27*)

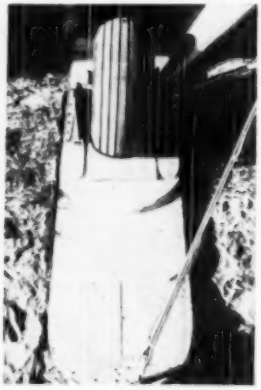
on the sides of steep rolling hills. I felt that the same could be done on the Sierra slopes right in the heart of the finest skiing terrain.

One afternoon I landed on several cattle ranches in little flower-covered valleys and on gentle hills thick with early spring grass. While circling one spot I was amazed to discover a Golden eagle flying formation off my right wing, his deep bronzed feathers glistening in the sun.

I have made both ski and wheel landings on magnificent slopes in the high Sierras. When the snow is hard packed, as it usually is in the morning hours along towards spring, only wheels are necessary. These landings are easier than on level ground. On such landings the plane stops very quickly and takes off in less than half the usual distance though the altitude may be over 11,000 feet.



Author's skis are reinforced birch planks, plastic covered. Wheels protrude an inch or so.



Ski-wheel combination works on land, grass or snow, though rough runways do scratch skis.

Down-hill acceleration might be termed "gravitational jato."

Late last summer we took off from a mountain meadow and were home in 30 minutes. That same trip by land would have involved a long hot dusty ride along curving and dangerous mountain roads, and then a hike or horseback ride of 15 miles. It would have taken all day to visit the place and another day to get back. Yet in one day we had gone in, caught our fish, swam and returned home.

Following are some results of my researches into the problem:

Engine. The first tests were made with a 65-h.p. Continental and were only fair but I believe they would have been much better with the right propeller. You need maximum power at take-off but because of altitude that is precisely the time you get the least. High pitch at take-off is another factor leading to poor performance because it prevents the engine from turning at full r.p.m. When I changed to an 85-h.p. engine I got better performance but it wasn't really good until I used a low-pitch propeller.

Propeller. I tried a number of propellers, including 72x42, 72x42 with 1½ in. cut from each tip, 76x34 (seaplane), 70x40, and 72x40—all on the 65-h.p. engine. I found little difference between them in actual performance. They didn't turn fast enough, or seemed to churn, and lacked performance. I'm sure that a 72/36, a 76x30 or a 74x32 would have been better.

On the 85-h.p. engine I first used a McCauley 71x44 and a wood propeller 72x40. Both turned about 2300 but the metal prop was better. After I had the pitch changed to 38 inches on the metal propeller the static r.p.m. reached 2500 and performance improved considerably. Solo in good cool air the rate of climb is about 1,000 f.p.m. Of course, if the engine manufacturers would give us geared engines with a slow turning propeller there would be a great improvement.

Cruising speed has been only slightly affected and at full throttle maximum speed is greater than with a high pitch propeller. If I hold level flight at full throttle the r.p.m. will go as high as 2750 and that is not good but Peter Altman, vice-president of Continental Motors, wrote me that at high altitude the engine could be run at 2450 or more with no damage nor strain. However, I cruise at 1900 solo or 2200 dual. It is interesting to note that apparently the gas consumption is not affected unless for the better.

Skis. Letters to ski manufacturers brought no information on a ski-wheel combination or whether it was possible to take off from grass. I built my own ski-wheel combination and it worked fine. I left the rear halves of the skis open and I'm now filling them in to see how they will function. I'm sure they will be as good and certainly they will be stronger. I hope to get CAA approval but that requires load tests that I consider rather severe.

Each ski is required to take 5,000 pounds distributed along the bottom, 1800 pounds on the side and 600 on the side at the point of turn up in front. Most commercially approved skis are far too small for soft snow but the severe CAA load requirement is doubtless the reason. The best ski would be long and narrow and very flexible, like foot skis. Such a ski would be very difficult to build and fulfill CAA requirements. In Labrador we used a ski on a Cub which was built flexible like a toboggan sled. It was 13 inches wide and seven feet long and very flexible. It handled well in soft powdery snow but I'm sure could not have stood the CAA load tests except at the very center. Undoubtedly this is a problem that needs complete reexamination by CAA. If skis used by human skiers had no flexibility they would be a total loss.

I tried take-offs and landings from grass and learned that green grass or wet grass has so much drag the skis will not slide; however, Bermuda grass which has not been watered and is dry looking is excellent and permits the skis to slide well. If it is wet, however, even from morning dew, the skis will not slide. Both take-off and landing is easy and no different from wheels, though I do use a little power on landing to give steering control and make sure the tail stays down if the grass should be sticky.

A couple of months ago I tried a tandem gear made by Art Whitaker of Portland. It is excellent for soft rough fields. A field so rough and filled with squirrel holes and rocks that it would seem impossible to land in can be commonplace with this tandem gear. For off-airport operation in mud or snow or rough fields there is nothing better. It does require a large turning radius while taxiing, however, and weighs 50 pounds, yet it is possible to land with brakes locked and not nose over.

Tires. To land with my normal gear I use the tires very soft. This works well on rough soft ground and though not as good as the tandem gear it works much better than do fully inflated tires. One trouble I had was constant pulling of the valve stems when I used brakes. By drilling holes through the wheel rim and screwing metal screws into the tire bead I have not had the slightest slippage nor a single valve pulled in three months of regular operation. The tires show no damage whatsoever from the screws. I use eight on each side of the tire but I expect that even four would be satisfactory—and perhaps on one side only to eliminate drilling through the brake drum where it is riveted to the wheel. Soft tires at sea level will become firm at an elevation of 10,000 feet.

Flying tips. There seems to be a definite relationship between rate of climb at sea level and ceiling. A plane which will climb 500 f.p.m. at sea level will have a ceiling of about 12,500 feet. A rate of climb of 1,000 f.p.m. seems to give a ceiling of about 25,000 feet. A rough formula of 25 times the rate of climb equals ceiling seems to be about right—at least for anything under 20,000 feet. It would be interesting to hear what tests by other pilots show.

Anyone can obtain the effect of high altitude right at sea level by setting the throttle several hundred r.p.m. less than full take-off power and noting the per-

formance. In my plane I am barely able to get into the air and climb when I set the throttle to 1600 r.p.m. just before take-off. This is about what to expect at 12,000 feet with 65 h.p. at full throttle. It would be safe and easy to make a downhill take-off under such conditions if the plane is able to make a gradual descent, but I couldn't recommend a level take-off at that altitude.

Actually, altitude seems to be less of a problem than the hot turbulent air of the desert. In the early morning the air of the mountains is usually cool and stable. Pilots must carefully check the surface, surrounding terrain and stability of the air. Test passes should be made down slope. It is important to leave yourself an "out" and not get caught where you cannot turn and fly out down hill.

It is absolutely essential to put the plane exactly where you plan. The plane should be flown just above the stall with enough power to keep it barely flying. When the throttle is chopped it will settle where you want it. The one thing to watch for—and beware—is a strong turbulent wind.

Use a low pitch high r.p.m. propeller for maximum power. At high altitude you will lose 100 r.p.m. anyway, so let it turn up at sea level but don't needlessly use full throttle.

Fly your plane light but carry emergency equipment such as pliers, screwdriver, wrench, wire, light rope, small bicycle pump, tire patch, extra valve stem, a little food and matches.

You don't know the real thrill of flying until you have flown in this manner to unusual places. The worst that can happen is a damaged landing gear. Practice for altitude operation and then land in the mountains. Your airplane will become truly a magic carpet. END

The Code

(*Continued from page 35*)

coding system appears troublesome and haphazard. It's not. It follows a logical sequence, and most pilot needs can be covered by memorizing the more common abbreviations. The code was prepared by cooperative action of the technical committee of the International Civil Aviation Organization, and is now an international system.

Incidentally, the code groups are often tacked onto the end of hourly weather sequence reports, giving in effect an hourly NOTAM advice for each station when important information must be transmitted.

It's important to remember that all NOTAMS are not sent in code. When the code can't convey the meaning, plain language is used in the composition of a notice.

Each teletype NOTAM transmission is preceded by the service prefix "NOTAM." The first letter is always "Q" (indicating only that the message is a code abbreviation). And city or facility designations always precede the five-letter code groups. END

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MODERN COWBOY

WHEN a heavy snowfall covered wildlife feeding grounds near Tieton, Wash., last winter, several hundred hungry elk starting foraging in apple orchards.

The state game department hauled over $12,000 worth of hay into a nearby feeding ground but when herders tried to force the elk from the orchards, the skittish animals scattered in all directions.

Irate farmers tried to discourage the invading herds with birdshot. When this treatment proved ineffective, they used heavy rifles. In less than a week, carcasses of 150 elk lay under the apple trees.

Then someone remembered that planes had been used successfully to move feed to starving herds. Why not use a plane to move the herds? Helicopter Pilot Carl Brady was called in. Taking off at dawn, Brady spotted a herd bedded down in one of the orchards. The sudden roar and blast of air as the 'copter skimmed over the trees didn't give the startled elk time to scatter.

Swinging the 'copter to right or left whenever one of the elk tried to break from the herd, Brady moved the first group through Tieton streets and into the feed lot before lunchtime. Four days later, the last elk was munching hay instead of apple buds.

—HERBERT JONAS.

Emigh Trojan

(*Continued from page 31*)

real shot of high-life by the installation of a 90-h.p. Continental, which replaced the original 85-h.p. engine, and Pop added performance in every category by a simple little gimmick on the ailerons that I'll explain in detail later. The *Trojan* is priced tagged at $3,295.

Pop was worried about "unskilled" labor at first but quickly learned that such fears were needless. The Douglas crew has almost tripled the man-hour production rate, with four men making it look easy to build one plane a week while Emigh is devoting his time to organizing a new, nationwide distributorship. The planes are moving out as fast as they come off the line.

Emigh's main idea was to stamp the airplane as much as possible from 8 x 12 ft. sheets of metal and he spent years in research on it. The outside rib idea isn't new, dating back into the 1920's at least. You have to watch a 200 pound man walk back and forth and up and down that wing quite a few times before you are convinced how rugged it really is.

The aspect ratio and wing loading are better than average despite the 31 ft. 7 inch span, aspect being 6.4 to 1, and wing loading only 9.25 lbs. These factors combine to provide the 45 m.p.h. landing speed and reliable slow flight control under 55 m.p.h. although the airfoil silhouette seems more on the high-speed than the high-lift side, an NACA 0012-63 section.

With the 90 Continental the power load comes down to 16.1 lbs. at a gross weight of 1450. The wing has a nice taper, 5° of dihedral and a 3° angle of incidence.

Now, 3° gave the ship a fairly level flight position and the 85-h.p. model will really get out and scat along despite its limited rate of climb. But with the 90, another of Pop's ideas suggested a moderate change and produced a fantastic result. He decided to droop the ailerons, thus effecting a little higher top curve ratio and tending to flatten the bottom side. They experimented and wound up with a 1¼ inch droop on the 85 and just under an inch on the 90.

This increased wing lift, lowered the stalling speed, increased the rate of climb, boosted the cruise by a good honest 10 m.p.h. and shortened both take-off and landing runs.

Anent the drooped ailerons, I saw a four-place prototype due for spring flight with a 145-h.p. Continental that uses 90 per cent of the same parts as the 90. Here, Emigh has doped out a way to use the full span ailerons as flaps for landing purposes, and my guess is that it will work such wonders that the two-place job will ultimately have them also. It's a nice idea, simple to do, with relatively little additional expense.

In tests they found that with a 7° droop the landing speed on the two-place 90 came all the way down to 30 m.p.h., but of course it wasn't practical to stabilize them there because it affected the cruising speed badly.

With the ailerons doubling as flaps you'll have just the right degree of droop for cruising and a selective choice for take-off, climb and landing. I'm hoping that Pop gets that taken care of soon as I'm a great believer in 30 m.p.h. landings.

The 90 that I flew at Douglas would indicate 95 m.p.h. at 10,000 feet using a McCauley 1B90-CM propeller with 71-inch diameter and a 50-inch pitch.

Cold, turbulent, high winds made any estimates of take-off performance impossible. Anything will get off short in a 40-mile breeze, but I'm willing enough to ride with Pop's claim for a sea level take-off at 400 feet. I'd set the rate of climb closer to 900 than the 800 which the factory claims, but again it's hard to reckon in that kind of air.

Not so hard to reckon is the handling character of the plane. This is plenty good. Control responses are fast and positive, there is no tendency to wallow or hunt, and while the elevators are super sensitive you don't porpoise except by overcontrolling.

Mardo Crane, who flew this ship to New York and back, said that she flew up to eight hours a day with less fatigue than in any other plane she has ever flown, including Air Force types which include the Martin B-26 and the Douglas *Invader*.

Being lanky, myself, with a posterior which can only be termed bony, I'm

afraid that eight hours in the *Trojan* with the present seat cushion, or lack of same, would hurt like hell.

There you have my main objection. The design puts you on the center section, which saves making a special seat but fails to provide the padding that tall, skinny people need when immobilized for several hours in an airplane. This does not impugn the *Trojan* alone.

The ship was licensed under .03 and has been given the load factor of 4.4 which seems to be about the maximum in the .03 category. But the *Trojan* might easily qualify for the .04 rating if there was any reason for it.

One pilot split-S'd with full throttle at 3,000 feet and it blew the canopy in when the ship hit 260 m.p.h. With the big wide air scoop thus created it must have put enough pressure in the tail section to blow an elephant through a 16-inch gun, but the tail stayed on and so did the wings.

A guess of 7 or 8 G's has been placed on the pull-out load, but all that was required to put the plane back in service was a new windshield. Because of the basic construction the *Trojan* will apparently take the same load upside down as it will in normal flight.

It is restricted against spins in the normal category but can be used for flight instruction with good results reported by operators who have them in service. The reason CAA kicked on spins was that the little crate really rotates and they thought that it could lead to trouble by scaring hell out of a person used to "normal" spin rotation.

I wanted to compare the 90 with the older plane, so made a flight in northern Utah with Uriah Wood, the intermountain distributor. Kicking it around pretty hard in very high stalling positions to see what the ailerons will do if abused, I got my feet tangled, ruddered wrong and spun it by mistake. The recovery was quick, sure, positive and easy, but we lost quite a hunk of altitude.

Otherwise, both models have a pretty decent stall. If you keep it up there and fight the rudders it will finally drop a wing pretty hard when it breaks at 45 m.p.h., an item I didn't like. Feeding aileron in, however, didn't make matters substantially worse and you have control back right after lowering the angle of attack.

You have to watch this at first, as the pitch forward or back is very quick and positive and in a normal, half-power stall, if you pop the stick forward very hard you can get the nose down a lot farther than you figured and subsequently build up a terrific speed that you hadn't expected. This in turn will lead to abnormal pull-out loads and the possibility of a high speed stall sometimes termed "secondary" stall.

The stalling nature is radically altered by that aileron droop I mentioned and once the "flap" arrangement has been incorporated the stall will be tamed and the stalling speed lowered still more.

One of the main points of controversy on the *Trojan* wing are the exterior ribs. This has led to widespread rumors that are erroneous. With the *Trojan* everyone says, "Yeah, but did you try to slip it?" The inference is that span wise flow of the airstream is disrupted by the ribs, spoiling lift and thus supposedly causing all kinds of control loss.

Actually, the plane has a nice, fully controlled slip that seems to work best if you keep the nose fairly high and the speed low—just like almost any other plane you want to name.

EMIGH TROJAN

One Continental 90 h.p. engine
Type Certificate No. 801

Wing span	31 ft. 10 in.
Length	20 ft. 3.2 in.
Height	6 ft. 5 in.
Empty weight	820 lbs.
Gross weight	1,450 lbs.
Wing area	156.8 sq. ft.
Wing loading (per sq. ft.)	9.25 lbs.
Power loading (per h.p.)	16.1
Top speed	130 m.p.h.
Cruising speed (75% h.p.)	119 m.p.h.
Stalling speed	48 m.p.h.
Maximum range (60% power)	550 miles
Rate of climb (sea level)	1,000 f.p.m.
Service ceiling	15,000 ft.
Absolute ceiling	18,000 ft.
Fuel capacity	28 gal.
Baggage	100 lbs.
Design structural load factor	6.3 G.

Source: Emigh Trojan Aircraft Co., Douglas, Ariz.

Aerodynamicists may prove lift loss from burbled air flow, but it doesn't seem to be a pilot's problem as the purpose of a slip is to lessen lift and increase the gliding angle anyhow. Control is there when you want to straighten out.

As standard equipment, the 90 has a floating Kollsman panel, the McCauley metal prop and an auto pulse electric fuel pump controllable from the dash for use in take-off and landing. Once in flight you can either turn it off or let it run as there's no pressure on it except in case of a pump failure on the standard system.

There's a stick control, and the nose wheel is steerable by the rudder pedals. The brake is a heel type, easy for a big footed man to reach while still on the rudders but a bit far away for a girl's foot.

Now that the mass production dream is over, Emigh has found the design even more important to his survival than ever. The very things that would make the *Trojan* a mass production man's dream also make it possible for a small operator to meet competition at established prices.

Right now the company is accepting orders for delivery in two weeks and is gearing its whole program to about that pace.

"We over-extended in the beginning," Emigh says, "and wound up building for a market that had vanished before our eyes. Now the pace will be slower, the plane will be constantly improving as we discover better ways of exploiting the basic design, and we'll try to grow on a slow, but steady foundation."

Pop has been working for this goal for nearly 20 years. This time it looks like he's here to stay and if you want my personal opinion, he's a pretty darn good product to stay with. END

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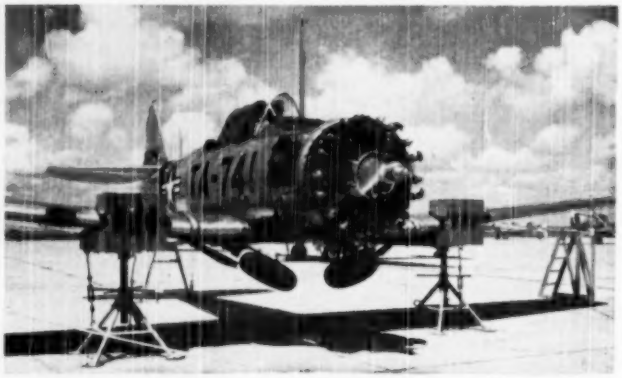

UNIQUE TRAINER

AVIATION cadets at Randolph Field, Tex., "fly" T-6 trainers without ever leaving the runway.

Sixteen "Captivair" trainers mounted on portable stands enable students to familiarize themselves with the engine, use all the instruments, and work the landing gear, flaps and rudder.

The planes can be set up in 20 minutes and dismantled just as quickly if they are needed for actual flight instruction.

Innovation of the "Captivair" is regarded by Randolph Field officials as one of the most significant advances in ground flight training in recent years.

Northrop Scorpion

(*Continued from page 15*)

choosing a razor-thin wing instead of a swept wing which has been used on the F-86, B-47, and Northrop's night-fighting competitor, the McDonnell XF-88. This choice was the Northrop engineers' solution to the requirement that an all-weather fighter have a slow landing speed. Slow landing is a difficult achievement with any heavy fast plane but especially difficult for one with a swept wing.

The slow-landing requirement, incidentally, is demanded by the fact that all-weather fighters usually are stationed at the outer perimeter of defense areas. They are almost always operating under marginal weather and visibility conditions and the runways they use are often make-shift and short.

To achieve high speed when necessary, and at the same time low landing speed when necessary, Northrop engineers have given the *Scorpion* a number of unusual design twists. One is the thin low-drag yet high-lift wing. Another is what Northrop calls "maximum-span" flaps, which were first used on the piston-engined *Black Widow* flown during World War II.

The *Black Widow* has retractable ailerons recessed into the wing and spoilers which free an added portion of the trailing edge for flaps. The super-thin wing of the *Scorpion*, however, prevented the use of spoilers. Northrop devised an entirely new control which it calls the "deceleron." The "deceleron" is a split control surface serving the triple functions of aileron, dive brakes and landing flap extensions. For normal maneuvers the surface functions as a conventional control surface. But for deceleration in flight, the two halves of the surface split open to become dive brakes. Their mechanical action is much like the "elevons" Northrop uses on its *Flying Wings*. For landing flap action, the lower half of the split "deceleron" drops down to serve as an outboard extension of the normal landing flaps.

The mission of the *Scorpion* is simple—to shoot down enemy airplanes at night or under poor conditions of weather visibility.

It can track down other aircraft and ground installations by day or night and in all types of weather. It has heavy armament, the details of which remain undisclosed. It is flown by a crew of two men—a pilot and a radar observer—seated in tandem in a pressurized cockpit equipped with pilot ejection seats.

In ordinary operations, the *Scorpion* probably will be dispatched singly or in small groups to intercept aircraft or formations which show up on ground radar scopes. It will be vectored by the fighter controllers on the ground until it is within closing range of the enemy. Then it will close for the kill using its own small radar or radars. No information on electronics equipment in the *Scorpion* has been revealed but it also undoubtedly includes IFF (Identify Friend or Foe) radar sets. These automatically inform the radar observer on the fighter whether the plane on which they are closing is friend or enemy.

Although heavy, packing a great weight of fuel, and with extra thick wing skins to provide a safer margin of rigidity at high speeds, the *Scorpion* is not a large plane in overall dimensions. It has a wing span of about 50 feet (only a little more than a Twin Beech) and a length of about the same, and is approximately 15 feet high. But within its rugged airframe are packed the range, speed, electronics equipment, and firepower to make it a fearsome weapon under the arduous conditions imposed by aerial combat at night or in foul weather. END

Report from Washington

(*Continued from page 36*)

one that used the word "otherwise." Characteristically enough, Washington, where minds are inclined to dwell on Governmental chatter, stuck in a few "procedures."

With the reluctance of all scientific men at expressing opinions before the completion of their tests, McCormick is somewhat chary when it comes to predicting which words in the flight vocabulary will turn up with the lowest intelligibility rating. But he does not mind admitting that "fire" is a pretty bad actor in this respect. Obviously this brings up the question of whether a substitute might be desirable.

Since no synonym for "fire" that would be any more understandable seems to be available there has been some speculation over the use of a code name. For example, a pilot could report "I have got a 'Babe Ruth.'" But here McCormick's knowledge of psychology steps in. He points out that experience has shown that under stress, men are apt to forget a code and revert to the word they have always used. Besides he believes that as long as the airways are used by large numbers of flyers of various classifications, new codes will have to come slowly. It is a far different matter from military flying where tight control can be exercised.

There has been some talk about the possibility of presenting instructions to pilots by visual rather than audible methods. In fact, the University of Virginia is now doing some general research on this subject. The purpose is to ascertain which sense is the most responsive under various conditions.

In its application to flying the scheme might involve such an imagination-provoking device as the televising of a radarscope to a plane about to land. The radar picture would be taken from the ground and would show the plane's relation to the field and to other aircraft in the traffic pattern. One thing that might militate against this suggestion is the undeniable fact that a pilot now needs two pairs of eyes in observing his instrument panel and watching his flight path during a landing. He would not have much time to study a radar picture or to read instructions recorded on a tape. END

Transport Dilemma

(Continued from page 11)

to be the next step forward for the domestic airlines.

Actually, such a jet offers the interesting possibility that it could serve effectively up to 90 per cent of available domestic airline traffic. The larger turboprop or piston-engine types seem indicated for extreme long range airline segments until better specific fuel consumption is in sight for the pure jet.

Of course, the effect of such high speed as the jet offers will dictate more frequent schedules. The jet airplane will be able to do more work—carry more passengers over more miles—because of this speed. For these reasons it seems advisable to reduce seating capacity to a minimum consistent with efficient utilization of fuselage shape and volume. Probably 40 to 50 passengers will be the best capacity for a domestic job.

Supersonic transports probably will be flying the airways in the future, but such characteristics will come only when some new power source, perhaps nuclear, is readily available. The present state of the art allows supersonic flight only with tremendous expenditures of power and with vastly increased structural strength requirements. These are factors which preclude an economic commercial application for many years to come.

It seems most logical that the first jet transport developed in this country would be built in cooperation with a Government agency. There is little possibility at present, barring enactment of a prototype bill of some sort, that private industry can afford such a project. The costs are tremendous, and the aircraft manufacturing industry is just not able to risk its capital without some assurance that Government support both in certification procedures and financing is forthcoming. The five contemporary commercial transport projects—the Martin 2-0-2, the Douglas DC-6, the Lockheed *Constellation*, the Convair 240 and the Boeing *Stratocruiser*—all have lost money—a total for all five projects of over 180 million dollars.

Jet bombers, such as the B-47, will require fast logistical support for efficient operation. Any future war will require a fleet of jet transports able to fly troops, supplies and equipment at 500 m.p.h. or faster. The use of jets as paratroop carriers has been suggested, and looks promising. Such a troop transport could fly in high and fast, dive quickly to low level, and with flaps and dive brakes extended deposit paratroops in any given area with a minimum of risk.

The lead enjoyed by this nation in transport aircraft now is in jeopardy. It is possible that our own airlines may have to buy foreign turbine-powered equipment to meet competition—just as Britain, France and other European carriers have purchased American transports to meet our competition.

American manufacturers for the moment are stumped. We must have a customer before we can spend the millions needed to properly develop a new transport. Perhaps it could be the Government—either military or by special allocation for such development. Perhaps it could be through the enactment of contemplated prototype legislation. Or such a type could be developed as a cooperative project of an airline or group of airlines, the Government and the manufacturer. It all adds up simply to this—we must have turbine-powered transports if we are to remain in the commercial picture as a nation. And we must have comparable jet troop and cargo carriers to back up logistically our high speed bomber and fighter units.

We have the engineering know-how, the facilities and the manufacturing skills. We have the practical experience needed to design, build and fly a big turbine-powered transport. And our people have an almost unbounded enthusiasm for the entire project. All we need is a customer and the chance to keep this country's airlines and national defense system up to date and ready to meet competition, whether it be commercial or military.

END

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The Outer Atmosphere

(*Continued from page 18*)

the top of Mt. Everest, for example, the atmospheric pressure has fallen to roughly ½ of its sea level value. At the outermost edge of the troposphere it has fallen to ¼ and at the outermost limit of the stratosphere to 1/3000 of the sea level value. From that point outward the absolute pressures approach those of a complete vacuum.

TEMPERATURE AND SPEED AT ALTITUDE. The temperature in the troposphere steadily decreases as altitude increases. In the stratosphere the temperature is at first constant, but then increases to a maximum in the ozone layer. Then it starts to decrease again and reaches freezing temperatures just inside the ionosphere. Then the temperature rises through the ionosphere to reach a maximum constant value of about 4000° in the exosphere.

But these hot temperatures do not have the same significance that they would have at sea level because of the extremely low particle density at such altitudes. The temperature registered by a thermometer in this region would be determined more by the rays of the sun falling upon it than the activity of the surrounding atmospheric particles.

Temperatures in the high atmosphere are extremely important because of their effect upon aircraft performance—first in affecting the strength of the aircraft structure by heating, and second because of their effect upon the speed of sound. The speed of sound is proportional to the square root of the absolute temperature. Thus, the speed of sound which might be 662 m.p.h. at 15 miles altitude (−67°) is 852 m.p.h. at 35 miles (+170°).

With increasing altitude, as the molecules of gas get farther and farther apart, sound waves are damped out in very short distances. Eventually the molecules are so far apart that sound waves are not propagated at all and there can be no "sonic speed problem."

WINDS AND CLOUDS. The wind pattern in the high atmosphere is still not entirely understood, although it is pretty well known lower down in the troposphere. Evidence suggests, however, that in the stratosphere and ionosphere there are extremely high winds. Their velocity and direction varies with the time of day and season and they are believed to be part of the world-wide circulation pattern.

Although most of the commonly observed clouds lie below the 10-mile altitude, two rare types of clouds achieve much greater heights. They are the nacreous clouds and the noctilucent (night-shining) clouds.

Study of the drift of noctilucent clouds and meteorite trails have been useful in measuring the wind velocities at high altitudes. The wavy form of these clouds and other calculations indicates extremely high vertical winds and turbulence at altitudes between 40 and 50 miles. Such winds may prove to be a hazard to vehicles flying at such altitudes.

ELECTRICAL PHENOMENA. Extensive electrical activity is underway in the atmosphere at all times. Lightning and auroral displays are merely obvious examples. Another visible electrical phenomenon is "light of the night sky," an electrically-produced luminescence that accounts for two-fifths of the light in the sky on a clear moonless night.

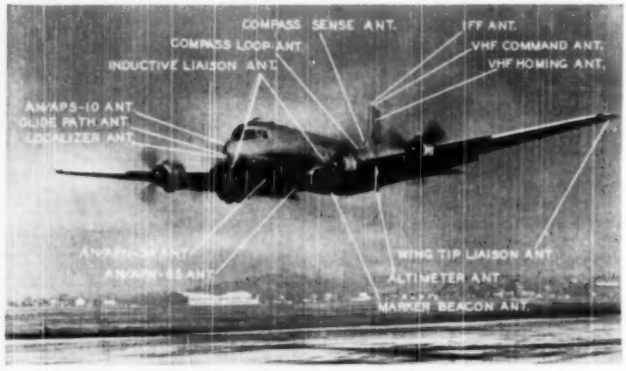
Non-visible electrical phenomena, such as the ionized layers of the ionosphere and the everlasting bombardment by particles of enormous energy, such as cosmic rays, are also noticeable. Radio waves near the broadcast frequency are reflected back to the earth by the ionosphere.

The structure of the ionosphere has been studied by measuring the reflections, absorptions, and time of travel of radio waves. These studies have identified four ionized layers whose intensity of ionization increases with increasing altitude. These layers are called the "D," "E," "F_1," and "F_2" layers. The layers of the ionosphere vary greatly in height and intensity, hence the differences in radio broadcast reception between night and day. Shorter waves, such as in television, penetrate the ionosphere to a greater extent and are generally not reflected back to the earth's surface.

MAN IN THE ATMOSPHERE. Generally, an unacclimated man needs oxygen above 10,000 feet for his best physical and mental well-being, and does not notice pain higher than 16,000 feet. Nevertheless, proof that man can be acclimated to great altitudes is indicated by the fact that the highest known community of men exists in the Andes mountains at 18,000 feet.

The limits at which most men can live without an extra oxygen supply vary with physical condition and duration of stay but are usually 15,000 to 20,000 feet. At around 40,000 feet, surrounding air pressure is no longer sufficient to permit a pilot to survive even on pure oxygen. At 55,000 feet, the water vapor in the body boils, causing the skin to inflate like a balloon. The power output of a reciprocating engine falls to zero somewhere between 55,000 and 60,000 feet. At normal body temperature, the blood itself will start to boil at a pressure altitude of 63,000 feet.

But at much lower altitudes than these, men can survive in comfort only in an artificial pressurized atmosphere. Flight at altitude has many complications which are not even understood as yet. END



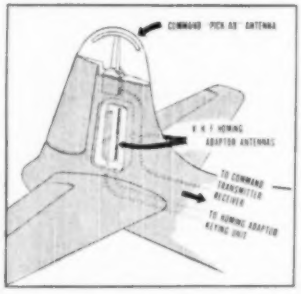
STREAMLINED ANTENNAS

ANTENNAS have "gone underground" in a large number of Air Force fighters, bombers and cargo planes.

The new look (antenna-wise) on the C-54 above is caused by flush-mounted aerials which save several hundred horsepower formerly required to overcome aerodynamic drag of the old-type exterior mounting.

Several "flush-mounting" techniques are used. The "pickaxe" type rides inside the aircraft tail, protected by a plastic radome. The "slot" type is, in its most simple form, a slit entered in a thin metal sheet. Several submerged type antennas are set down into the aircraft structure and covered with a dielectric material.

Advantages over old antennas are obvious.



A single streamlined one-foot antenna of the old stub type, protruding from the plane's surface, expended 200 h.p. at 600 m.p.h. That's enough power to pull two low-priced automobiles.

Turkish Air Force

(Continued from page 23)

serves his entire military time as a private with no opportunity for advancement.

The Turks were more than happy to take advantage of the Truman Doctrine, which proposed in part to give military aid to Turkey. Public Law 75, approved May 22, 1947, authorized 400 million dollars for Greece and Turkey of which Turkey was allocated 100 million. Of this amount, $26,750,000 was for the Turkish Air Force.

"We tried to supply the roof and walls for the Turkish Air Force the first year," says Maj. Gen. Earl S. Hoag, who organized the U.S. Air Group and directed its activities the first 17 months in Turkey. "The second year, our efforts were to strengthen the foundation with further supplies and an intensive training program." The general commanded ATC in India, flying the famed "Hump" operation early in the war, later commanded the ATC European division during the entire European operation.

In the spring of 1948, Congress authorized a second year's aid program and $25,275,000 was allocated to the Turkey Aid Program.

This resulted in more equipment being shipped to Turkey so that the need for more American advisers on training became more acute. Result was that the size of the U.S. Air Force Group gradually expanded in Turkey until its present strength exceeds 150.

American technicians now work with the Turks at every base where American equipment is used. At Eskisehir, the Turkish Randolph Field, Turkish cadets fly American T-6 and T-11 training planes and British *Magisters*. Instructors are Turkish, but American pilots advise them in setting up training schedules along U.S. Air Force standards.

After receiving their wings, the young flyers are assigned to tactical units where U.S. veterans of World War II act in an advisory capacity. All these tactical advisers are combat veterans and their words carry weight with the Turkish pilots. When 28-year-old Capt. Jack Thornell of Redondo Beach, Calif., tells Turkish fighter pilots what the F-47 can do in the air, they listen. He flew a *Jug* in Europe and shot down 21 Nazi planes.

One of the Turk's top priorities has been an improved communications system, and great amounts of U.S. equipment have been delivered. The Turkish Air Force is now in the midst of a control tower construction program, with new American equipment installed in temporary control towers on some fields while mobile control tower units are used in others.

Air engineering equipment (bulldozers, cranes, shovels and rock crushers) have been brought to Turkey and personnel trained as aviation engineers. The Air Engineering School is at Cuma Ovasi airfield at Izmir. It has graduated heavy equipment operators and mechanics who are now engaged in constructing and maintaining runways and taxiways. Air Engineer battalions have been activated with these men as a nucleus.

Most ambitious job begun by the Turkish Air Engineers is at Diyarbakir in southeastern Turkey, where a new runway was started last summer. Two years ago the Turkish Air Force would never have contemplated constructing a complete runway from scratch; they had neither equipment nor know-how.

One of the big needs of the Turkish Air Force was medical equipment, and a School of Aviation Medicine was started a year ago—with the first class of five Turkish Air Force doctors graduated in April, 1949.

In addition to the training in Turkey, however, a number of Turkish officers and non-coms have been sent to the U.S. and to American bases in Germany for training. Many have completed stateside training and are now back in Turkey as instructors.

U.S. aid and the intense nationalism of the country have combined to create high morale. The boundaries of Turkey have been constant for 26 years and the people are determined to keep those boundaries. It is this spirit, plus U.S. technical assistance, that makes the new Turkish Air Force the finest in the Middle East and one that is improving noticeably month by month.

END

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KING-SIZE, 293, Brockton, Mass.

CAA Rules

(*Continued from page 13*)

an elaborate review of stresses for safety of operation, etc., so as to be sure that nobody will get hurt.

"Where the hindrance to development comes in is that the gentlemen who write these rules and regulations are neither inventors nor engineers nor developers. They are merely expert observers who are writing down the specifications for last year's aircraft because that is the only kind they know about. And the engineer who wants to develop next year's aircraft has to go laboriously through the process of having these rules altered so that his idea will come under rules—rules that didn't exist until his idea came along, and rules which frequently are not allowed without interminable argument because of the natural reluctance of the official mind that feels—and quite rightly—that it has a conscientious duty for which the Government is paying.

"And then from this (continues Mr. Loening) there is built up a vast fabric of submissions for approvals and regulations and inspections, all predicated on two questionable fundamentals. First, that the buyer doesn't know enough to know what he is buying and, second, that the builder is an incompetent engineer who has designed something for the public market that is likely to fall apart.

"If we wish to lift this terrible hindrance from the back of aircraft development we must undergo the risk that the public has every right to assume . . . to buy what is offered after due knowledge on the part of the buyer that the Government does not guarantee what he is getting and due knowledge on the part of the builder that if he furnishes something dangerous, he is liable under the law for damages or false representation."

Loening points out that manufacturers of refrigerators, or farm tractors or locomotives can build what they want without submitting to Government certification. Anybody can build a small cruiser without elaborate certification of seaworthiness by a Marine CAA. "And to be sure, some of these cruisers occasionally blow up, and have fire risks, and propellers drop off, and the hulls are too weak to resist ordinary driftwood, and they get into a lot of troubles and considerable danger and sometimes sink."

Suppose that automobiles, which are dangerous vehicles that kill perhaps 40,000 persons each year, had to be built under Government type certificates as airplanes are now. Let's assume that the Government told automobile manufacturers how to design a front assembly for a given calculated load. But when the automobiles got out in service with those assemblies they were not strong enough and failed.

Can you imagine the dealer or the manufacturer explaining to the irate auto owners that "the wheel met Government specifications?" Can you imagine the manufacturers failing to bring out fluid drive because there were no Government specs for it? What would have happened to the automobile industry under such a handicap?

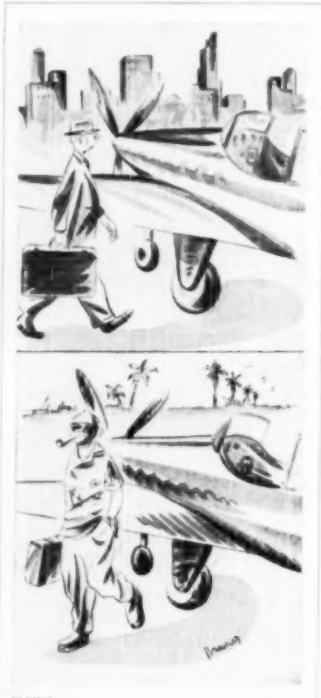
The President's Air Policy Commission in its famed report, "Survival in the Air Age," recommended that type certificates be abolished and that the aircraft manufacturers be made fully responsible for their own airplanes. This, of course, was never done.

The CAA states that it tried to comply with the recommendations and tried to give responsibility to the manufacturers, but manufacturers would not accept it.

This myth has been repeated so often that even some of the manufacturers believe it. The facts are that after the Air Policy Commission Report, and before T. P. Wright resigned as Administrator of Civil Aeronautics, CAA approached the manufacturers and in effect said something like this: "You can be responsible for your planes hereafter, and you can build them any way you want to, *except that any part which doesn't meet our standards we can still make you change.*"

Obviously it would be impossible to work on such a basis. The manufacturers would have had to bear the responsibility for guaranteeing their own planes without being able to build them as they wanted to. Quite properly they rejected this proposal.

If the CAA had proposed to the manufacturers: "Build your plane any way you want to and if it fails in service, then we will ground it," they would have been talking sense. But to try to shoulder all the responsibility upon the manufacturers and all the authority upon themselves was an improbable solution.



FLYING

The CAA says of this criticism, "Well, the manufacturers are satisfied."

Satisfied! They're scared to death to open their mouths with a public complaint. They're scared of the inspectors because they know that hostile inspectors can make it prohibitively expensive or even impossible for them to comply with CAA rules and regulations. Long delays and high certification costs have helped drive more than one manufacturer to the wall.

We have used certificates as a crutch for so long that for an indefinite period we are probably going to need some sort of certification. The Non-Scheduled Flying Advisory Committee has unanimously recommended that a substitute procedure be used. Let the manufacturer with enough guts prove his basic design by rigorous flight tests instead of paper work, and then let him make improvements as fast as service testing and his engineering work show that such is needed. The public would quickly get genuinely improved models rather than be forced to continue too long with the rough prototype as originally certificated.

The CAA bureaucracy is certain to start howling about the dangerous airplanes that will flood upon the market. But no system is perfect and certificating by actual performance tests seems a better system than the present faulty plan—and in addition *it permits design progress.*

Of course the CAA will oppose a change in certification policies. The men whose jobs will be diminished will oppose it. As always, when a movement gets underway to strip them of some of their power, they have come up with an alternative from which the teeth are pulled. Even some manufacturers seem to go along with a current proposal to rewrite and abbreviate Part 03. That will accomplish nothing. It will continue, as the present Part 03 has done, to embalm the past and look backwards toward the future.

Some manufacturing engineers likewise will oppose a change. They are as comfortable with the system as the CAA inspector is. Their main job is to use a slide rule to prove compliance with the present specifications and for the most part they are men who create nothing. Of course they will resent change. The CAA airworthiness rules may be valuable as a code for those who choose to lean upon it. But they should never be considered more than that.

There is no truly logical reason why aircraft should bear this burden any more than automobiles should bear a similar burden. As Grover Loening so clearly points out, "I do not need to review for you the several instances of automobiles that were brought out and were found dangerous and actually caused accidents, and how quickly the public learned about it and how quickly their business was ruined. And the automobile business, of course, is the striking example of the fact that the 'survival of the fittest' is the best checkup of a stress analysis." END

The Mail Box

(Continued from page 44)

its perishable cargo, and its double crew were promptly impounded and we were obliged to remain sitting outside the airport manager's office in the terminal throughout the night and until 5 o'clock the following afternoon when we were taken into court. During that time the cargo sustained several hundred dollar's worth of damage.

The captain was held on bail, and the rest of the crew and plane were released shortly before dark. We jumped aboard, and cleared just in time (while the airport manager stood on the ramp with a watch in his hand.)

In the meantime the captain had to wait over the weekend for a preliminary hearing. His Stateside senator cabled, requesting that the trial (to be held in the Canal Zone) be transferred to the States. The request was refused and since it would have cost more than the $250 bail to make the return trip for trial, the captain forfeited bail and came home on an airliner.

Incredible? Actually, the details here are minimized.

MARY C. MORRISON

Short Hills, N. J.

Last summer my 17-year-old daughter and I flew a Cessna 140 from Boston to Panama and back along the mainland, visiting the capitals of all eight Central American countries.

We felt that we were treated with uniform courtesy and cooperation and didn't encounter "the bite" anywhere. The largest landing fee was $3. I do not recall any customs charges at all except $1.66 to one official who came out to the airport at 6 a.m. to clear us. We gave no officials any gratuities except an occasional pack of cigarettes. While I unfortunately had to have major repairs made to the plane in Panama, I felt very fairly treated by each of the two fields where work was done.

Colonel Adams talks particularly about conditions at the southern Mexican port of entry, Tapachula, and says that it is impossible for a lightplane to go through without paying from $20 to $60 in fees. . . . Tapachula used to have a well deserved reputation of this kind, but I heard frequently last summer that it had been cleaned up. And the treatment we received there bears this out. Both going south and returning north, we were under handicaps which involved violation of Mexican customs or immigration rules, but no advantage was taken of these handicaps. We paid no charges and gave no gratuities.

Regarding difficulties with officials, we left Panama early Sunday morning, stopped in Costa Rica and again in Nicaragua for gas and landed for the night in Honduras, without seeing a customs, immigration or any other official at any point. We paid no charge whatsoever except one $3 landing fee, and were not required to show any of our flight permits although we did have them.

GEORGE R. BLODGETT

Boston, Mass.

IT WAS NOAH

Hy Sheridan should read his Bible more carefully. . . In "Logging Time" [November, 1949, FLYING], he says that Moses released a bird to find a landing place. He has his Biblical characters mixed. It was Noah, not Moses . .

PAUL E. MARTIN, MINISTER
The First Methodist Church

Holdrege, Neb.

. . . Hy Sheridan should go over his Bible again, especially Genesis 8:6-11.

DEAN E. OGLEVIE, QUAKER PREACHER

Paonia, Col.

• Says red-faced Sheridan: "The trouble with me is that I read the Bible up to the point where it says, 'Ask and ye shall receive.' Since then I haven't read any further. I've been too busy."—ED.

Stewardess

(Continued from page 28)

talking to C&S employment manager, D. W. Jurgensen, and J. W. Meyer, director of passenger service. Men had appraised Marie Jeanne before, but none with the calculating eye of the man 100 C&S stewardesses call "Mother" Meyer. He took detailed, if impersonal, note of her trim figure, clear brown eyes, grooming—even her teeth. Aside from her obvious physical bonuses, Marie Jeanne met all the standard requirements: height 5' 2" to 5'6", weight 100 to 126 pounds, education four years of college or two years of college and two years of business experience. (Chicago and Southern, like most airlines today, no longer requires that stewardesses be registered nurses.)

After her talk with Meyer, Marie Jeanne was sent to see Chief Stewardess Jayne Kommer, a crisp young blonde who fired a series of rapid questions. Would you mind cutting your hair? Will a change in temperature affect your health? Would you mind moving around the country? Do you meet people easily? Do you have a calm disposition?

Then it was Marie Jeanne's turn to ask questions. She learned that a C&S stewardess makes from $180 base pay per month to $240 after five years. Each girl buys her own uniform, a trim light gray gabardine suit, and the company pays for its cleaning four times a month. All meals, lodging and limousine transportation away from the base station are paid by the airline. If hired, she would fly approximately 85 hours a month, with a chance to bid on the runs she would like after the first six months.

Seven days later, Marie Jeanne was asked to report to Memphis for a three-week training course. These courses are held at three- to four-month intervals, depending on the number of stewardesses who resign. (Incidentally, 95 per cent leave their jobs for a single reason—to get married.)

During the 21-day training period, Marie Jeanne and five other girls studied the history of C&S, the miles and minutes of the various routes, duties of the stewardess at the airport before flight, in

(Continued on page 66)

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(Continued from page 63)

flight and after flight, how to talk to first riders, how to take care of babies, how to awaken sleeping passengers, how to set up and serve meals, how to administer first aid, and so on.

"I couldn't wait to get on an airliner and work my first flight," she said. When that first flight rolled around, however, she was almost ready to pass it up. Instead of a routine trip, she was assigned to a DC-3 carrying 15 company executives—among them C&S vice-president (now president) Sidney Stewart. But the trip turned out to be more fun than work, with Stewart presenting Marie Jeanne with her wings at the front of the cabin.

In the ensuing 28 months, Marie Jeanne has worked on both DC-3's and DC-4's, has been based in Memphis and New Orleans, and has flown with some 15,000 passengers of assorted age, physical condition, financial responsibility and fame. She's had to refuse politely a 10-cent tip offered by a little old lady and a $1,000 bill offered her by an eccentric Texas oil man; but she's been given cake, flowers, candy, perfume, handkerchiefs and a toy duck by captivated passengers.

Between flights, Marie Jeanne lives in a six-room apartment on New Orleans' St. Charles Street along with five other girls—and one male companion, Karl von Eulenspiegel. Karl shows no partiality and apparently loves each girl with equal intensity. He's a two-year-old dachshund.

On Tuesday and Friday mornings, Marie Jeanne takes Karl for his usual morning walk, then drives her 1942 Ford to Moisant International Airport and boards Flight 300. In Chicago, she checks in at her regular room at the Stevens Hotel, stays overnight, and is up with the pigeons for an early-morning ride out to the airport.

There, she goes through the procedure in reverse, becoming the "Stewardess on Flight 301" for the southbound trip. Everything is the same as on the inbound flight—except the passengers. They, and their questions, vary daily. One portly businessman recently asked her: "Say, how can this plane make such good time with those darned steps hanging out the side?" Marie Jeanne, with the aplomb of a veteran stewardess, didn't laugh or even look amused. She explained that the steps were pulled away before each flight.

One woman, unfamiliar with airline catering service, was flabbergasted by the stewardesses' efficiency. "My," she gasped, "I'd certainly like to know how you two lovely young girls can cook 50 meals in that little kitchen—and so quickly!"

Although the girls don't cook the meals, their speed in "setting up" and serving is phenomenal. It takes only 25 minutes to serve 50 passengers, and another 30 minutes to clear all the trays and clean the buffet.

At flight's end the job isn't finished. After saying goodbye to passengers, Marie Jeanne has to inspect the plane's cabin, straightening it and looking for lost articles. Airline passengers are no different from urban commuters when it comes to leaving things behind. Stewardesses have found crutches, cameras, false teeth, wigs, umbrellas, marriage licenses, shoes (with socks in them)—and, on one trip, a salesman's sample case full of diamonds.

Marie Jeanne still feels sorry for the meek little man who had to come back to claim the girdle his wife had taken off and left in the "blue room." But even he, after talking with Marie Jeanne, left the airport feeling quite debonair about the whole business.

It's that ability to turn sow's-ear situations into silk-purse results that airlines want in their stewardesses. To get girls with that kind of ability, they screen thousands of applicants each month. Only a few make the grade—but those who do, like Marie Jeanne, prove that a hard, often tiring, job can be glamorous—and fun. END

Hy Sheridan

(Continued from page 17)

Those were all the types of stalls that I tested. I did not think to try a very nose-high stall, like a mild whip stall, and so I cannot report if any of the planes will go into a series of swoops.

It was time to land and I brought her in. I leveled out at 16 feet because with a DC-6 at 16 feet the landing gear will just fit between you and the ground. That is too high for an *Ercoupe*, so I recalled after a time, and then I landed once more at ten feet and that was too high also, so I landed once more at seven feet. That was all the patience the *Ercoupe* had, so it sighed and sat down, and a nice soft landing it was, too. I taxied up to the line, swung into place, and cut her off. Ol' Banker Face got out.

Boy, what a wonderful plane! Not like a Jenny, definitely not like a Jenny. I sat there thinking of it. Ol' Banker Face turned resignedly and walked back to the plane. "Unbuckle her," he advised. "We don't wear 'em in the house."

The next plane that flew me was a Cessna 170. If I were restricted to a word, and that is a goal that the editor is still striving for, the word for this plane would be nimble. It is as neat and trim as a Youthform ad. In flight it is quiet and fast.

The stalling characteristics were orthodox. When fully stalled the nose would flop down to an angle of about 30° to 35°, but there was good aileron control all of the time. A mere touch forward on the wheel would stop the stall instantly.

The landing gear surprised me. Two pieces of flat steel for each strut looked like it would bounce the plane into the air on a rough landing and would be mighty stiff. The fact was that it was wonderfully soft, and it stuck when it was on. And the gear was sturdy. I tested that, too, believe me.

The next plane was the Beech *Bonanza*. The cabin was excellent, with full blind instruments. It is a beautiful plane but its most surprising ability was its speed. It seemed to cruise just as fast as the DC-3 airliner that I flew so many years. One of the most handy and satisfying things was the throttle rod. All of the ordinary push-pull rods are hard to position just right when taxiing; you push and you get too much power, and you pull and get too little. The *Bonanza* has a push-pull rod also and you can open up the engine or shut it down with one motion in the usual manner, but in addition there is an ingenious linkage so that by turning the knob right or left you can get just exactly the amount of power you want and get it smoothly.

It is a shame to criticize a plane so excellent as this but I felt on the very hot day that I flew it that it ought to have a little more ventilation, more of a stream of air to keep the occupants cool. It was a very quiet cabin.

I was a little annoyed in rough air. When this plane hits a bump it has a little side-wise oscillation, like a fat lady fitting her foundation into a chair. Owners say that after a little while they don't notice this motion any more. During the first part of the take-off there was a good deal of torque; I had to hold hard right rudder. Both of these individualisms may be associated with the butterfly, or V, tail.

This is a good place to mention that the Cessna, the *Bonanza*, and the *Navion* had just about the same stall characteristics.

The *Navion* was just what you would expect from the North American outfit, for this design was born there and the plane is now being built by Ryan. It looks and acts like a *Mustang*. One gets the impression of great sturdiness and durability. The controls are very well coordinated, that is, there is just the right amount of control movement and feel for each maneuver.

In this airplane you can get all of the ventilation you want but it is a little noisy in the cockpit. The climb is very good for such a strong machine, and it can land quite short if you wish. The safety pilot showed me a short landing over an obstruction. I didn't measure the run but when we stopped I could spit back to where we touched down, or at least I could if I were in training.

Airplane performances are compromises, and it is not surprising to note that a very stout plane like this has a lower cruising speed than the *Bonanza*.

Well, that's the four of them, all I could find at the moment. Grand ships, every one. That's what I think of them. What they might think of me is something that I could only guess at and didn't care to.

One of the safety pilots, after our test flight when we walked away from his pet airplane, said to me, "When you really get familiar with this plane, brother, you can make her talk!"

"I'd be satisfied," I answered, "if I can just get her to shut up." After all, a man had his ego to keep up. END

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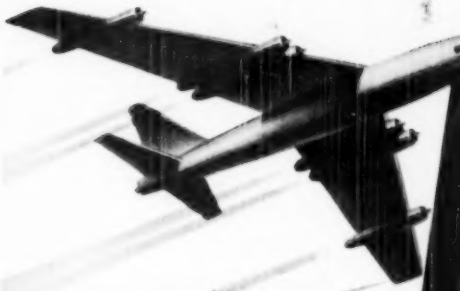

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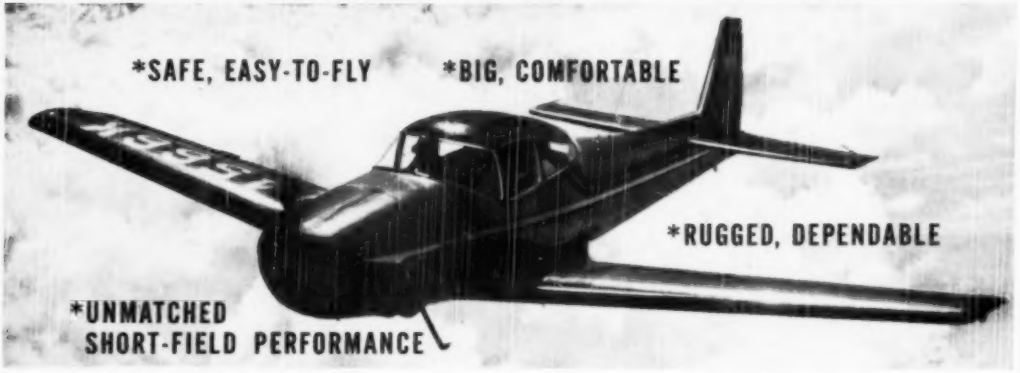

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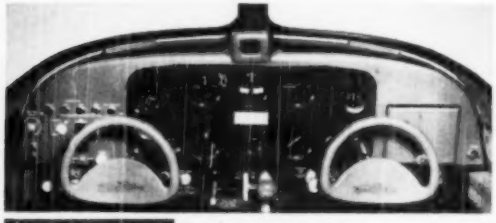

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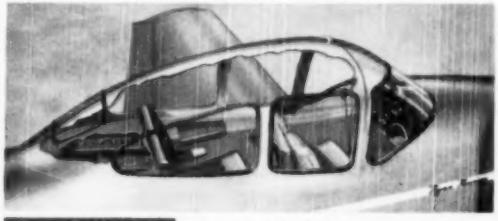

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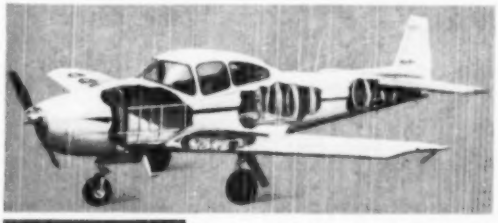

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